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DEVOTED TO THE INTERESTS OF TEXTILE CHEMISTRY
• BLEACHING • DYEING • FINISHING • PRINTING •
AND THE NECESSARY MECHANICAL EQUIPMENT

"Circulated Everywhere Textiles Are Processed"

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Official Publication of the American Association of Textile Chemists and Colorists

THE OBJECTS OF THIS ASSOCIATION ARE:

"To promote increase of knowledge of the application of dyes and chemicals in the Textile Industry.

"To encourage in any practicable ways research work on chemical processes and materials of importance to the Textile Industry.

"To establish for the members channels by which the interchange of professional knowledge among them may be increased."

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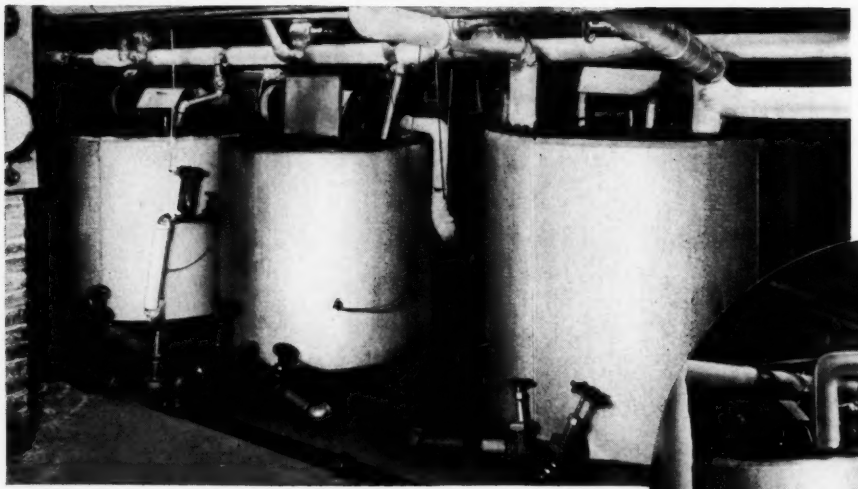
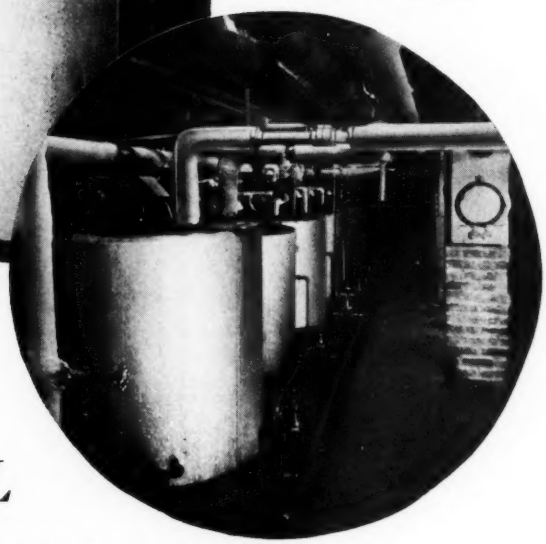
Any Size CRACK *is* TOO BIG *in a Size-Kettle!*



Three of the nine Nickel-Clad Steel size-kettles (cookers and storage), installed at the plant of West Point Mfg. Co., West Point, Ga., Lanett Mill division. The kettles were fabricated by R. D. Cole Mfg. Co., Newnan, Ga., of ¼-in. thick 10% Lukens Nickel-Clad Steel, using welded construction throughout.

(Below) The other six of this plant's nine size-kettles. Of the nine, seven are cooking kettles, 42 in. dia. x 42 in. high; two are storage kettles, 48 in. x 48 in. Agitators and heating coils in all are Monel.



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AMERICAN
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VOLUME 25 NOVEMBER 16, 1936 NUMBER 23

The Textile Chemistry of Sulfites

P. E. HATTINGER

SOME of the most useful compounds to the practical processor are also the simplest chemically, and it is wisdom to give every reagent the fullest investigation before deciding that it is no use to you. The price of bisulfite of soda is low, of the order of 3 to 6 cents per pound, crystal. Alternatively, liquid sulfur dioxide may be bought rather more dearly in cylinders. The analysis and valuation of these products is simple and straightforward. A standard decinormal iodine solution is prepared by dissolving 12.7 gms. solid elementary iodine together with 25 gms. potassium iodide in a liter of water. To estimate a solid sulfite, a little is weighed out and added to 25, 50 c.c. or other known amount of iodine solution acidulated with sulfuric acid. The flask containing them is gently agitated until the solid sulfite has dissolved. The excess of iodine may then be titrated with sodium thiosulfate using a starch indicator. In all iodine-thiosulfate titrations where starch is used as indicator, the solution must be cold and after the blue color has disappeared, any subsequent re-appearance must be ignored.

For the sake of those whose memory is not so good, the oxidation or the burning of sulfur produces two gases:

Sulfur dioxide ..... SO_2
Sulfur trioxide ..... SO_3

Both dissolve in water to give acids, namely sulfur*ous* and sulfuric acid respectively. In the case of sulfurous acid, the sulfur atom has not acquired as much oxygen as it is capable of combining with, and the result is that sulfur dioxide, sulfurous acid and sulfites, all possess an unsatisfied affinity for oxygen which causes them to behave as reducing agents and abstract oxygen from other compounds when circumstances allow.

When sulfurous acid is added to a solution of potassium dichromate which is yellow, the chromate radicle is reduced with a destruction of the yellow which changes to green, due to chromous sulfate. Sulfuric acid has no such effect on potassium dichromate because it is oxygen-satisfied. When sulfurous acid is oxidized, sulfuric acid is formed.

The reducing capacity of sulfites is admirably illustrated by reference to a paper by Kobe and Gooding of the Department of Chemical Engineering, University of Washington, recommending the addition of sodium sulfite to boiler feed water in order to remove dissolved oxygen. The combination of sulfite and oxygen is stated to be almost instantaneous at boiler temperature, but at outdoor temperature, it takes time, and the addition of 1 part per million copper sulfate as a catalyst is recommended so that de-oxygenation is achieved in 2 minutes. The role of oxygen in producing corrosion of boilers is well known now, and its effects are particularly evident in waters rich in mineral salts; oxygen encourages corrosion. (See Industrial and Engineering Chemistry, March, 1935).

A recent publication of the Tin Research Bureau states that the washing of tin-plate with soda detergents is rendered less likely to cause corrosive damage if a small addition of sodium sulfite is made to the wash liquor.

Sulfur dioxide and acid solutions of sulfite reduce chlorine giving hydrochloric acid and sulfuric acid:

$$SO_2 + 2H_2O + Cl_2 = 2HCl + H_2SO_4.$$

This reaction is much used where it is desired to remove traces of chlorine or hypochlorites from a liquor, or from textile fabrics. After chlorination, for instance, wool is "anti-chlored" usually and rendered free from the objectionable smell of that gas by treatment with a bath of bisulfite of soda, which is simply sulfite + sulfuric acid.

The following description deals with the chlorination of 3/150's slack twist woolen yarn on a semi-production scale, as carried out by the writer in a works quite recently. Into a tub measuring 3 feet across was placed 4 buckets of water and 1 liter of hypochlorite liquor so that the mixture Twaddled at 2 degrees. The wetted yarn was introduced immediately after 200 c.c. of strong sulfuric acid had been added, and worked about for 15 minutes. The antichloring process which followed involved the use of a tubful of water containing 100 c.c. of saturated sodium bisulfite together with 50 c.c. of sulfuric acid. The yarn was well washed in water and allowed to drain a few moments and then placed immediately in a hydro-extractor running slowly, meanwhile a hose was used.

The finished yarn was dried as usual in a drier of the brattice type, and then dyed green with other non-treated yarn. When woven into Wilton carpet, the fabric had a very effective luster and the dyeing was level although colors subject to unlevel dyeing were used. There was no after-smell.

Gaseous sulfur dioxide is well-known as a bleaching agent for wool and silk and the practice of hanging up damp woolen goods in a "stove" in which sulfur is burning has been used in the trade for many years. About 6 or 7 pounds of sulfur is required to bleach every 100 pounds of wool and it is usual to expose the stock overnight to the vapors. The excess gas is blown away next morning with a current of air, but some residual trace still remains on the wool which is not easily eliminated. The white obtained by the above process is not permanent and the recovery of the natural yellow tint of the fiber is accelerated by washing. The low cost of this bleach is an effective point in its favor, though there is no doubt that peroxide bleaching has ousted it to a large degree in modern factories.

In view of the fact that sulfur dioxide is a reducing agent it is not quite clear why it should also bleach, which is a property usually associated with oxidizing agents. Probably the color-destroying qualities are due rather to its activity in combining with certain organic groups which are present in natural and synthetic dyes, bringing about a conversion to less highly colored compounds; a species of addition reaction rather than the chemical decomposition which takes place with nascent oxygen-producing bleaches. The work of A. T. King and F. L. Goodall on the sulfite addition compounds of dyestuffs certainly indicates the truth of this view.

An alternative to bleaching wool with sulfur dioxide gas, is to treat it with an aqueous solution of sodium bisulfite, but this method is not very satisfactory. According to German Patent No. 415,583, wool may be bleached very cheaply by impregnating it first with a solution of sodium bisulfite of density 1.003 to 1.007, and then drying it.

A method for bleaching straw braid with sulfur dioxide is given in U. S. Patent No. 1,568,664. The employment of an inexpensive process of bleaching is obviously essential where a cheap fiber is to be considered and sulfur dioxide will undoubtedly fill the bill as well as, and better, than other chemicals in such circumstances.

In the bleaching of linen in order to avoid undue loss of weight in processing, Bochter omits the usual kier-boiling with alkali and instead, subjects the goods to a boiling under pressure with dilute bisulfite solution. Afterwards an oxidation process is applied. (British Patent No. 180,325.) In a later publication, Bochter reports that the pretreatment of linen, hemp and similar fibers with aqueous solutions of neutral or acid bisulfites at temperatures below 35°, aids the bleaching with peroxide or other per-salts, applied subsequently. (German Patent No. 405,245.)

The process of bleaching and of stripping are not unrelated in the chemical sense, but to the dyer or textile technologist, they are two very different things. Bleaching is the process for removing natural color such as is present in animal and vegetable fibers in their raw state. Stripping, however, is concerned with the removal of synthetic color, or dye from goods which have already been processed, and in some dyers' minds it is very closely bound up with the phenomenon of off-shade which is never a popular topic. However, even in the best regulated dyehouses, stripping is called for sometimes. Most stripping agents are reducing chemicals which attack the dye molecule or if not attack it, loosen its hold on the fiber. Sulfites have a stripping action and even gaseous sulfur dioxide has been known to cause sudden drastic fading. In the old days when shop windows were lighted with open gas flames, and when the coal gas supplied was impure, textile goods were occasionally observed to fade in color very quickly and the cause was not very obvious at first.

Even when the fading was traced to sulfur dioxide derived from the burning gas, that was only part of the story; it remained for King and Goodall in 1930 and subsequently, to show that the fading, or stripping effect was dependent upon the nature of the dyestuff, and on the ratio of SO_2 and free alkali present together. Certain azo dyestuffs containing naphthol groups were noticeably most subject to the phenomena, for instance Orange II and Fast Red A. Again, the existence of a certain ratio of SO_2 to NaOH was shown to be essential to the reaction, namely 1 to 1.3 respectively. King describes the matter more fully in the Journal of the Society of Dyers and Colorists, 1930, volume 46, page 225. The discovery of this reaction was useful in two senses. Firstly, it enabled dyers and technologists to understand more fully than ever before the causes of fading of dyed wool from exposure to sulfurous fumes. [Conversely, this means faults from this cause could be prevented in future by leaving dyed woolen goods in a slightly acid condition for use and wear.] Secondly, it meant a new stripping method was available to dyers and colorists. In the latter connection, the use of the process has been covered by British Patent No. 332,389.

To prepare a sulfite liquor under the so-called "active range" condition for bleaching or stripping, dilute a solution of sodium sulfite or bisulfite in water until it contains about 2 per cent of SO_2. Then add caustic soda until a pH value of 6.8 is reached which is green to the indicator Brom-Thymol blue. If the mixture is yellow more soda is required, while the addition of more bisulfite is indicated by the mixture being blue. The active-range sulfite mixture will decolorize dyed wool when a solution of equal SO_2 content more acid or more alkaline will not. The use of this method is obviously limited as far as stripping is concerned, to a few dyes.

A common source of sulfur contamination is paper which is bleached and processed with sulfite and frequently contains enough available SO_2 to affect the color of dyed

textiles with which it comes into contact. Hence an analytical process for examining paper and other wrapping material which may have contact with wool is obviously useful to the technologist. Goodall of J. R. Geigy's (J. Society of Dyers and Colorists, 1934, page 10), describes a method in which sulfur is oxidized to sulfate with iodine and estimated by precipitation as the barium salt. As follows:

Paper or other material suspected of containing sulfur is weighed into a 150 c.c. round bottomed flask together with 60 c.c. of a reducing mixture and 10 c.c. of 10 per cent barium chloride solution. The quantity of paper taken should be sufficient to yield 0.001 to 0.002 gm. of barium sulfate. The barium chloride solution is added to the reducing mixture in order that impurities in the reagents may not affect the result. The reducing mixture used is prepared by adding 100 gms. of stannous chloride to 100 c.c. of strong hydrochloric acid almost at the boil. Fifty c.c. of water is added then.

Having got the paper, the reducer and the barium chloride in the flask, it is then connected by delivery tube to a conical flask in which is 100 c.c. of 10 per cent caustic potash solution and 50 to 100 c.c. of decinormal iodine. The use of an anti-splash head between the flasks is advisable to prevent the passage of acid over into the alkali in the receiving end.

The contents of the round bottomed flask are boiled for 30 minutes, or until sulfuretted hydrogen is no longer evolved by reduction of the sulfur compounds. Having reached the alkaline iodine mixture, all sulfuretted hydrogen is oxidized to sulfate which may be determined in the usual way by precipitation with barium chloride, filtration and ignition. To covert $BaSO_4$ to sulfur, multiply by 0.137.

HOW SULFITE ALTERS THE PROPERTIES OF WOOL

It has been known for many years that the treatment of wool with bisulfite solutions increases the affinity for dyestuffs. Thus in order to accomplish this purpose the goods may be impregnated with a concentrated solution of this material and then steamed. Unfortunately such drastic treatment weakens the fiber as well as shrinks it and makes it dye unevenly, but heating wool to boiling in a dilute aqueous solution of bisulfite is said to bring about greater affinity for dye without at the same time damaging its physical nature. Alternatively, bisulfite may be added to the dyebath where the dye is resistant. This process is the subject of the German Patent No. 247,589 to E. Elsaesser published about 1912 when the facts regarding the interaction of dyes and sulfites were not well understood and when "active range" was non-est. There is thus some justification for re-examining this proposal.

The writer has often wondered if the consequences of this phenomenon are not more widely felt than is commonly realized. Can this increased affinity effect operate in media in which sulfites are apparently absent, if only to a smaller degree? It is not unlikely that wool substance may act in the role of reducing agent towards sulfuric acid, and that during the dyeing process involving this acid and sulfates, some sulfite is formed in situ. Is it inconceivable that the sulfur in wool and hot acid are under certain conditions capable of interacting? It would be useful to see a little investigation done on these lines.

There is at least a shred of evidence that commercial sulfuric acid contains sufficient sulfites to exert influence. How many wool printing works subject wool intended for color printing to a preliminary treatment with sulfuric acid at the boil followed by whizzing and drying? It is found that by this simple inexpensive process wool is made whiter and to have a better power of taking the color when the print paste is afterwards applied. The writer contends that it is easily possible that the slight sulfite content of commercial vitriol may account for the result obtained. Sulfite or bisulfite, as we have seen, both bleach wool and increase the dye affinity.

E. Justin-Mueller has recently described a process involving the treatment of wool with bisulfite in color printing practice. (Textilber., 1935, 16, 322.) Firstly, the wool must be clean and in the right condition for the process. A mixture of 15 parts sodium bisulfite liquor of 35° Bé. and 85 parts of water is made up and a small piece of wool placed on the surface of this solution. If the skein sinks in 30 to 50 seconds, that wool is suitable for printing, but if not, if sinking takes longer, the goods must be given a boil in dilute vitriol containing a little wetting-out agent.

The dyestuff paste is made up of dyestuff, 50 parts; British gum, 400 parts; 50 per cent Monopole soap, 50 parts and water, 500 parts.

A paste for printing purposes may be made up from the foregoing color paste as follows:

Color paste (as described)	540 parts
6 per cent Gum Tragacanth	335 parts
Sodium bisulfite, 35° Bé.	125 parts

After applying the paste on the drums, the yarn is dried but only just, and then steamed for one hour without pressure, after which it may be washed.

By employing bisulfite in the print paste, Justin-Mueller gets a deeper coloration which is comparable with the effects obtained on chlorinated wool, yet has none of the wear-reducing after-effects of that process. Naturally, colors resistant to sulfite must be used exclusively, but in making this choice there is no great difficulty, thanks to the great amount of research into sulfite-sensitivity of various dye makers. Examples such as Supramine Yellow, Supramine Red GG, Alizarine Brilliant Blue R, and numerous others might be found or ascertained by inquiring of color manufacturers.

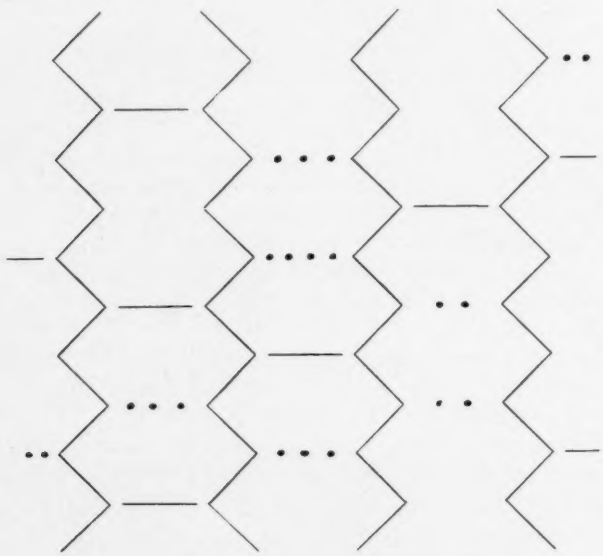
The manner in which sulfite affects wool as regards its color and as regards its affinity for dyestuffs have now been described. Sulfites have, however, other influences on wool and are capable of changing its physical form. Elsaesser showed a number of years ago that when boiled with bisulfite, wool contracted 30 per cent of its original

length and became rubbery. As a result of researches into the chemical nature of wool by Speakman and his co-workers, it is now known that a wool fiber is made up of long chains of polypeptide groups built up together of millions of units of —CO—CH—NH— linked together. These chains run parallel to the length of the fiber. These chains are bound together at intervals to make a species of trellis work, the cross-linkages being of two kinds:

(1) the cystine bridge, $—CH_2—S—S—CH_2—$

(2) the salt linkage, $CH_2—COO^-\ \ H_3N^+—CH_2—$

The ultimate structure of the wool molecule is shown in skeleton form below, the exact atomic arrangement being somewhat more complex, of course.



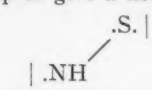
The idea of the polypeptide chains made up of successions of —CO—CHR—NH— is conveyed (somewhat crudely it is true), by the upright wavy lines. The manner in which atom chains are linked by cystine bridges and salt bridges is also illustrated by the solid lines and the dotted lines running horizontally.

The above diagram represents a fully stretched fiber. When unstretched, the polypeptide chain tends to curl up like the cord on a telephone when twisted. Such coiling is however under the control of the cross-linkages, and so in the natural fiber, is consequently limited. The explanation of the fact that boiling wool in bisulfite causes great longitudinal contraction is that this treatment destroys the cystine linkage and also the salt linkage as well.

The cystine and salt linkages are also responsible for numerous other of the common properties of the wool fiber. For example the phenomenon of giving wool a permanent "set" by steaming may be explained by the linkage mechanism. Before steaming polypeptide chains are linked together by innumerable cystine bridges —S—S—. Under the influence of steam, a reaction takes place and the link is broken:

Before steaming: | —S—S— |
After steaming: | .SH HOS. |

It is now believed that the SOH group may now react with an amino group to give a new linkage:



This can only be possible if the —SOH group couples with an amino group in a neighboring atom chain, and even then a re-adjustment of the two chains with reference to one another will have to take place. That some such mechanism does operate is shown by the observation that wool in which the necessary NH— groups have been destroyed is incapable of receiving a permanent set.

It may be the result of deep research, or it may be only rule-of-thumb, that makes hairdressers use sulfite of soda in connection with waving woman's crowning glory, human hair. Evidently this practice has been in use for a considerable time. Of particular interest to textile technologists, and also perhaps to hairdressers, is a recent patent to Imperial Chemical Industries and Messrs. Piggott and Speakman (British Pat. No. 443,359). Under the influence of ultra-violet light, the cystine linkages of wool fiber tend to get broken, and in point of fact, wool gains in weight 2 per cent when exposed to the rays. In consequence, such wool or hair loses its ability to receive a permanent set. Irradiated wool gives poor results on crabbing, while human hair loses luster and "nature."

The above patent states that the setting properties of wool and hair which have been lost by atmospheric oxidation may be restored by treatment of the same with a composition containing sodium sulfite and a fatty alcohol detergent. Thus to loose wool, sulfite is added to the last bowl of the scouring machine, when as a result, the response to crabbing and blowing is increased. As a preparatory to waving the hair, the application of a 6 per cent solution of a composition is made, then it is washed off. The resulting wave is made more permanent and the luster of the hair is said to improve. A typical mixture is as follows:—

Cetyl sodium sulfate.....	15 parts
Cane sugar	35 parts
Anhydrous sodium sulfite....	50 parts

A sideline of the topic of sulfite utilization in textile chemical work which deserves at least mention, is that of sulfite-cellulose waste liquor, a by-product of the paper industry. Use has been found for this material for making protective compounds for wool which is subjected to alkaline liquors. U. S. Patent No. 1,419,497 to Goldberg, Onnertz and Peters covers this application.

Sulfite-cellulose waste liquor has been recommended as a reducing agent for the vat to replace hydrosulfite and it is reported that fabrics dyed with indigo may be stripped with it.

Hand Block Printing of Silk

With Chrome Mordant Colors

T. C. HUTCHINS

IN the production of any type of print the first consideration is the choice of a thickening agent for the proper preparation of the print pastes with which the prints are to be produced. In silk printing particularly this matter is of the first moment. A good thickening must fulfill the following conditions:

1. High color yield. 2. Clear cut printing impressions. 3. Level colors. 4. Clarity of color. 5. Good penetration of the prints. 6. Good solubility so that the thickening is easily washed out.

For silk printing all of these points are important although the manner of color yield has often to be sacrificed to some extent in favor of better impressions, etc.

It is well known that thickenings with a high starch content are likely to give the highest color value in any style of printing. For silk however the use of starch must be practically ruled out, this being especially so when the use of chrome colors is contemplated. Chrome mordant colors when used with starch have the effect of occluding with the thickening so that hard insoluble bodies are formed which are exceedingly difficult to remove during the final wash-off. Not only is this the case but the printing impressions formed when using starch are far from satisfactory, being uneven, spewed at the edges and generally lacking in clarity and the other properties expected of a silk print.

The use of industrial or British gums has something to recommend it. Here again however any gum with a high starch content must be avoided as far as possible. All of these gums have a starch basis and only those qualities which are highly converted or torrefied and which therefore contain the lowest percentage of unchanged starch, are suitable for this class of printing. On the other hand there is danger from the presence of dextrin, with many members of the chrome mordant dyes which are susceptible to the influence of reducing agents. The advantages of using such a thickening may however be enumerated as follows: 1. The prints are level and free from dark edges. 2. There is no formation of hard compounds with the chrome mordant. 3. The printed material is easily freed from thickenings, etc. during washing-off.

The next class of thickening to be considered is the natural gums e.g. Arabic, Senegal, tragacanth, locust bean etc. The outstanding advantages of these first two thickenings is that they produce clear, sharp impressions with all classes of color. On the other hand with chrome colors they have the great disadvantage of forming very insoluble compounds with the chrome mordant. This latter defect has been overcome in recent years. It may also be overcome to a large extent by the omission of the chrome mordant in the print colors which in the majority of cases have a direct affinity for the silk fiber. The only drawback to this latter recommendation is that the colors so produced have inferior fastness properties to those containing the mordant. Another point against the use of chrome colors without mordant is that in some instances the color produced is entirely different in shade from that obtained with the mordant. For instance in one case the color produced with the omission is a biscuit shade while on the addition of the mordant a bright blue results.

Probably the most satisfactory thickenings of all for general purposes are the so-called crystal gums. There are several qualities of these gums for different grades of work all of them being of excellent solubility and their especial characteristic being sharpness of the print outlines. These gums are rather more expensive than natural or industrial gums but the makers claim that their high thickening power makes their use an economical proposition. From this standpoint a good deal would depend on the type of print being produced and the price obtainable for the same.

When choice of a thickening has been made the next step is the preparation of the printing color. At this stage it should be emphasized that the range of obtainable colors has been greatly enlarged of recent years.

Of course there are many other ranges of this type of dyestuff which are very suitable and by a diligent search through all the brands available a very satisfactory range of shades may be produced. One fact must always be borne in mind and that is that the shades produced on silk differ vary considerably from those obtained on vegetable fibers. For instance a dyestuff of the Modern or Gallo type of black gives a very full and bloomy navy on silk either with or without mordant, the color obtained with the mordant being heavier and deeper than the more bloomy shade obtained without the mordant.

If the fastness of the prints is not a primary consideration it is a good plan to strike-off each shade on silk with and without chrome mordant. The results will often be surprising and often very useful besides increasing the range of shades available to a very considerable extent.

The methods adopted in mixing the colors for print-

ing are as follows. The "standard" method and the "weight" method. In the first mentioned it is usual to make up a standard solution of the necessary dyestuff and from this standard reduce the color with the necessary thickening to the desired shade. The method has the advantage of handiness and convenience to say nothing of its accuracy in repeating shades. The only objection which can be lodged against it being the danger of settling out of the dyestuff in solution or the concentration of the dyestuff when a standard has been allowed to remain too long in use. For the making up of very small quantities of print paste such as are required for block prints it is the only method which can be used with any great accuracy especially when dealing with very light shades.

In making up print colors by weight the method is simple. The amount of dyestuff required is weighed out and dissolved in the necessary quantity of water. The solution thus formed is next carefully filtered and added to the thickening after which the mordant is added to the cold mixture. A typical recipe would be as follows:

4 ozs. dyestuff dissolved in
1 pint hot water and added to
5 pints gum thickening. Thereafter add thickening or water to bulk to
1 gallon print paste.

The principal objection to this method of working is that it can only be applied to the mixing of dark and medium shades. For very light tones the only method is to work from a standard as described in the previous paragraph.

The actual printing process is carried out by means of blocks made principally from wood. The art of block cutting for silk printing is only to be acquired through long years of constant training and practice. The blocks may also be made from other materials on a wooden base e.g. copper strips, lead castings, white metal castings, copper outlines filled in with felt, etc. For one pattern the number of blocks required corresponds to the number of colors to be printed, which in very intricate designs may run up to five or six. The majority of silk prints however do not exceed three or four colors.

When printing, the printer works at a long table up to twenty feet in length. Alongside the table there is constructed a stage on which is set a "case". The "case" is simply a wooden frame five or six inches deep with a wooden water-proof bottom. This case or trough is filled with old print paste or thickening and on top of this is placed another smaller framework of the same type with an oil-cloth bottom. The arrangement is such that the smaller case floats on the surface of the thick liquid contained in the larger one which thus provides a resilient bottom or foundation. Inside the smaller framework there are now spread the necessary number of woolen sieves for accommodation of the printer's colors. On each sieve an amount of print color is spread sufficient to soak the sieve thoroughly. The amount of color is carefully adjusted so that the surface of the sieve carries just sufficient color to furnish the surface of the printer's block with the necessary amount for the production of a good impression.

When printing silks especially, it is very bad practice to work a block with an excess of print paste. The result in such a case would be the flushing of the prints, dark edges, and filled up spaces. These faults will occur more readily on silk than with nearly any other fabric by reason of the lack of absorbing power. The fabric itself may not appear to be so thick as other fabrics which are more easily penetrated but the silk being constructed in the form of rod-like fibers does not absorb the color just so readily and therefore the danger of faulty prints is greater.

As a result of this condition it is a temptation to printers to use an excess of print paste in order to try to get a better impression. The danger of this course is that the prints may become very uneven and measly on the surface as a result of the excess color.

In actual printing the cloth is spread or sometimes gummed on the surface of the print table. If the silk is gummed, the usual practice is to use a very thin solution of gum arabic or alternatively the surface of the back-grey may first of all be moistened slightly and then sprinkled with dry industrial gum, which is then brushed over the surface. The foundation for the printing operation is composed of (1) The concrete or other solid foundation of the table-top. (2) A thick layer of woolen blanket. (3) One or two layers of disused back-greys. (4) The clean back-grey. It will be noted that such a foundation is firm yet resilient so as to allow of a fair amount of pressure for the penetration of the print paste without making the prints appear scabby and thin. If the printing bottom is unyielding the result is that the color is simply forced through the material without being actually absorbed. This effect may take place to such an extent that in some cases there is actually more color on the back-grey than on the printed piece.

When the colors have been printed and dried the next operation is steaming for development of the colors. Where continuous steamers are available this is undoubtedly the most satisfactory way to carry out the process. In most cases however where an hour or longer is the period of treatment the ordinary cottage steamer is called into requisition. In the latter case the prints will have to be protected from the action known as marking-off. This takes place more readily on silk although not to the same extent with chrome mordant colors as with others such as basics, acids. etc. For the prevention of this fault the prints are greyed. By this is meant the interposition between each lap of printed goods a layer of black grey or similar material. This is easily accomplished by winding the goods on the reels along with the grey but the period of steaming will have to be extended to twice the usual in order to ensure thorough penetration of the steam.

The cloth is wound on to a collapsible reel in loop form and as each reel is completed it is hung on to a pole. A series of poles carrying their loads of material is then

hung upon a framework which running on iron rails is pushed into the cottage steamer and steaming carried out at 7 lb. pressure for the necessary period.

When the colors have been completely developed the next step is the removal of the thickening by appropriate washing treatments. Where suitable arrangements are available, washing-off is carried out in the open width, but with chrome mordant colors the washing may take place even more effectively in the rope form. The best type of apparatus for this purpose is a series of becks furnished with elliptical winches. This type of winch gives the maximum of mechanical agitation with the minimum of strain on the material. The long axis of the winches take up the silk gently from the liquor while the turn of the short axis throws it into the bath again with a splash. The continued repetition of this action results in a thorough cleansing of the material from thickenings and surplus color.

The prints after washing are hydro-extracted and dried by any available means. For the more delicate types of material drying should of course receive rather more consideration and be carried out on a stenter frame or hot flue prior to finishing.

With regard to the last named operation it need only be said that this is a separate subject but in the writer's opinion a print that is freed from all surplus thickening and color is sufficiently soft to require the minimum of finish.

In printing crepe de chines by block with chrome colors an excellent finish was obtained in the following manner. The goods were washed off as described and hydro-extracted thereafter being dried over cylinders. The next operation was stentering out to the finished width during which process the silk was run through the double nip of a three bowl mangle in water of 10-12 deg. hardness. The finished obtained thus, in fact played a large part in the sale of the goods and all attempts to improve upon it met with failure.

It will be recognized of course that it is quite probable that the finish so obtained owed much to the local conditions of washing, water supply, colors, printing, etc., and that the same treatment in different circumstances in all probability would not produce so satisfactory a result.

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Testing of Rainproofed Cloths*

Tests for Some Characteristics of Fabrics and Garments Treated for Water Resistance

N. CRYER, A.T.I.

VERY heavy, closely woven wool materials, such as men's overcoatings, afford good protection in inclement weather. However, protection against rain is very often necessary in warm weather when a heavy coat is unsuitable. The difficulty here is overcome by treating a summer-weight fabric, whether it be made of wool, cotton, or any other textile fiber, in such a manner that the material will give the wearer the desired protection against rain. This is achieved by making the fabric either impermeable or water-repellent, that is, waterproofing or rainproofing.

Waterproofing consists of coating the material with some substance, as for example, vulcanized rubber or a drying oil, which is impervious to water and renders the material definitely waterproof as long as the coating is in good condition. The substance can be applied to one or both sides of the texture. Rubber proofing of cloth is carried out by passing the material through rollers which transfer a thin film of rubber solution to the texture. Several layers are usually applied to ensure evenness, and then the material is passed through the vulcanizing process. Fabrics coated with rubber are made into "mackintoches." The drawback to this type of garment is that it is airproof as well as waterproof, and as a result the garment tends to become uncomfortably warm when worn in summer, and condensation takes place on the inside of the garment.

Rainproofing consists of impregnating the fabric with some substance that is insoluble in water. Many gabardines and covert cloths are treated with aluminium acetate solution followed by a soap solution. The insoluble soap formed is deposited in the material and renders it water repellent without altering its appearance. As a result, the material is not insulated against air—as is a waterproofed texture—and the resultant garments do not cause overheating and are not uncomfortable to wear during warm weather.

If a small pool of water is formed on a proofed material of this type, it will not immediately wet it. With a well proofed cloth it is generally found, even after some time, that the water has wet the surface of the cloth but has not penetrated or spread. A poorly proofed cloth is fairly quickly wetted at the point of contact with the water, and the water may spread rapidly.

It should be noted, however, that when water is poured on to a fabric there is practically no pressure. Therefore,

*Textile Manufacturer.

this test is only a measure of the absorptive properties of a cloth, and is no criterion of its true rain resisting capacity.

One point which results from wear is concerned with the "roughing up" of gabardine rain coatings at points of friction. Where abrasion has taken place the surface is easily wetted. It appears, however, that it is only the rubbed up fibers which absorb the water. Apart, therefore, from the discomfort of the water clinging to the surface of the cloth at the affected places, the rain resisting capacity of the garment does not appear to be greatly diminished.

TESTING WATER-RESISTANCE

The efficacy of a chemically proofed garment seems to depend not so much on the thoroughness of the proofing treatment as the texture of the cloth and the linings and interlinings, if any. Although the resistance to rain offered by a material can be tested several ways, the "drop test" method seems to be favored most as it approaches more near to practical conditions than other methods.

In principle, the drop test consists of allowing drops of water of a known size to fall at a constant rate on to the material under test. The material is supported by plate glass, held by means of a frame at an angle of 30° or thereabouts. Blotting paper is placed between the cloth and the glass. Immediately the drops of water succeed in penetrating the material the blotting paper becomes wet and shows as a dark patch—observed by reflection in a mirror underneath the glass. The number of drops required to achieve penetration is the numerical value of the rain repelling qualities of the material under test.

Experience suggests that if penetration takes place at 1 drop the material itself will not offer much resistance to rain. Six to 8 drops appears to be a medium quality, while a high-grade material will withstand 40 drops. These figures apply to a rate of 60 drops per minute, with a drop size of 0.06 c.cm., and a fall of 4½ ft.

The apparatus described below (and illustrated in Fig. 1) has been found to give reliable results.

It consists of an upturned bottle resting on the brim of a beaker and held upright by an iron stand. A corked opening in the bottle permits of easy filling. A rubber tube from below the level of the water in the beaker is syphoned to a curved, drawn glass tube. As the water flows from the end of the glass tube, it gathers and falls off in the form of drops at the point indicated by an arrow in the illustration. The rate of the drops can be regulated to almost any speed by lowering or raising the glass tube. Water drawn away from the beaker is steadily replenished by that from the bottle, thus keeping it at a constant level, and thereby ensuring an unfluctuating rate of drops of water.

EFFECT OF STRUCTURE

An examination of the results of testing chemically proofed fabrics by the drop test method shows several interesting features.

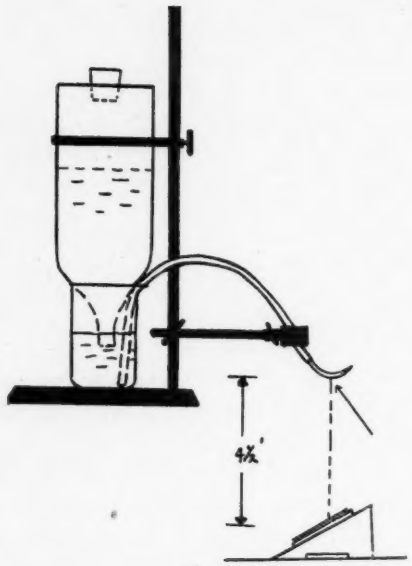

Fig. 1

The results of many tests indicate clearly that where a heavier cloth is obtained, either by using thicker yarns or by increasing the fineness of the structure, its rain resisting qualities are increased, other things being equal. See Table I.

TABLE I.

	Weight oz. per yd.	*Ends per in.*	*Picks per in.*	*Average number of drops before penetration*
Union				
Gabardine	15.0	118	69	30
"	13.0	115	64	8
"	11.0	115	64	1
Cotton				
Gabardine	9.5	197	118	40
"	8.5	163	105	4

This is due to there being less space between the threads through which the water can pass under the pressure of its own weight. The threads themselves strongly resist penetration on account of their increased surface tension —obtained by the proofing treatment.

That penetration occurs most readily at the interstices of the cloth, as seen from the particulars given in Table II.

TABLE II.

	Weight oz. per yd.	*Ends per in.*	*Picks per in.*	*Average number of drops before penetration*
Cotton				
Gabardine	8.5	180	98	3 to 4
"	11.0	132	64	1 to 2

Although lighter in weight, the finer woven fabric with consequential smaller interstices offered greater resistance.

EFFECT OF LINING OF GARMENT

In order to ascertain the rain retarding qualities of a

raincoat, it is not sufficient to test the material alone, as the lining of the garment plays an important part in giving protection to the wearer. For example, if an unlined model were lined with the same material—that is, self-lined—the resistance to rain qualities of the garment would be increased manifold. This is shown by figures, such as the following, which are typical of a large number of tests.

One cloth, 3 drops (average).

Two cloths, 30 drops (average).

The advantages of a proofed lining to a raincoat are:

(a) Greater uniformity of protection. More open places in the outer material are unlikely to come opposite similar places in the lining.

(b) The outer material breaks the force of the rain, and thus there is insufficient force retained to penetrate a proofed lining. On account of its proofing the latter does not readily soak up the water which lies between the two textures. As a result a garment with a proofed lining resists rain to a relatively high degree.

(c) An unproofed lining, however,—especially if made from a fiber with a high capillary attraction, such as rayon —would not only soak up the moisture which has penetrated the outer cloth, but also act as a kind of blotting paper, and actually draw water through the outer cloth at the points of penetration. This is shown by the following test: A union gabardine, with a resistance of only 1 drop, was tested by the drop test method, first with an unproofed rayon lining, and second with a lining similar in texture, but proofed. After 40 drops, 0.5 c.cm. of water had penetrated to the unproofed lining, while only 0.02 c.cm. penetrated to the proofed lining after a similar number of drops. Thus the amount of water which actually passed through the gabardine cloth was 25 times greater with the unproofed lining than with the proofed lining.

CONCLUSIONS

(1) The weight and closeness of a chemically proofed fabric greatly affects its rain repelling qualities.

(2) Within reason, it is better to have a light, closely woven texture than a heavier, but more loosely woven cloth for protection against rain.

(3) The absorbency or otherwise of a raincoat lining largely influences the efficacy of the garment. By reason of its affinity for water, an unproofed lining causes a much greater amount of water to penetrate the outer cloth. Further, an unproofed lining readily soaks up the water that has penetrated the outer cloth.

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Application of Certain Chemical Methods to the Determination of Quality of Raw Cotton. (*Abstract*)

Address, American Society for Testing Materials, October, 1936.

By Carl M. Conrad, *Cotton Technologist, Bureau of Agricultural Economics, U. S. Department of Agriculture.*

THE sampling of raw cotton for purposes of measuring the properties of the fibers, is attended with great difficulty. The basis of this difficulty lies principally in three factors, (1) the enormous variability in the different properties of the individual fibers, (2) the tendency for similar fibers to be associated on the cotton seed and to remain associated after ginning, and (3) the clinging nature of the fibers which makes effective mixing extremely difficult.

Recognition of these difficulties has led to the examination of possible ways of solving the sampling problem. One of the most promising possibilities at the present time is the application of chemical techniques. The special advantage of these is that the fibers can be reduced to powder condition and thus overcome the difficulty of mixing, without interference with the chemical results. This cannot be done in the case of physical testing.

Examples are given showing that chemical methods may be more sensitive to influences which damage the textile quality than are physical tests. At the same time, it is pointed out that a series of cottons classified on the basis of their chemical measures have, at the same time been classified in order of their spinning quality, as determined from strength measurements of the fabrics. It is also shown that in most cases studied, the fluidity of raw cotton in cuprammonium solution may be used to classify different raw cottons according to both the Chandler strength of the raw cotton and the strength of yarns manufactured from them.

Extraction of fatty substances before making fluidity measurements in four selected raw cottons indicates that the quantity of these substances present does not affect the time required for solution nor seriously interfere with the fluidity measurements.

Pectic substances were investigated in these four cottons and found to be entirely of the protopectin type. The results did not support the theory recently proposed by Farr that these substances are entirely responsible for the viscosity of cotton cellulose, since in this study, the cottons with the higher content of pectic substances gave solutions of lower viscosity. The quantity of pectic material was not associated with time required for solution.

See Program for

Annual Meeting

and Convention

A. A. T. C. C.

on page P622

Dermatitis*

WHEN some evil genius prompts us humans to consider the dangers that surround us, we are not infrequently left with a feeling of wonder at our continued survival. The many chemists who listened to Dr. H. E. Cox's lucid account of the chemical aspects of dematitis at the opening meeting of the London Section of the Society of Chemical Industry must have wondered how they had escaped this dread infliction for so long, and, if they could still bear to think, they must be still wondering how much longer they are likely to remain immune. As chemists, we may perhaps reflect that "the devil takes care of his own," and leave it at that. Chemists habitually handle so many of the substances that are known to produce dermatitis in lesser breeds, that it would seem that they should be the first to be attacked. That they are not is a puzzle to which Dr. Cox could give no answer. Possibly chemists, from the need for avoiding errors in their work, wash the contaminating substances from their hands immediately. Or it may be that the multiplicity of substances is in itself their safeguard, the one neutralizing the effect of the other. Perhaps it is that they are just naturally thick-skinned; there may be something in this argument, for chemists handle so large a variety of substances, and expose their hands to heat and other agencies so frequently, that they may for the most part have evolved their own protection. If that be so, however, young chemists should not have acquired immunity and may be frequently attacked.

The economic cost of dermatitis to industry is very great. It will be news to many that during 1934 no fewer than 3,216 cases received compensation. This compensation was paid for the most part to workers engaged in handling chemical substances, but there is also another danger to which the law courts bear witness in the onset of dermatitis upon those who use, or only wear, goods containing certain substances. The most frequent causes of dermatitis among the general public rise from substances used or worn by multitudes. Dyed furs, and particularly those dyed with oxidation dyes such as p-phenylenediamene, dimethyl p-phenylenediamene, amino-phenols and toluylene diamines are prone to lead to trouble. Textile dyes give rise to a number of cases, though the percentage of those affected to those using textiles (or furs) is infinitesimal. The difficulty here is that no types seem to be immune, and, in Dr. Cox's words, "it seems likely that almost any synthetic dye if applied to a sufficient number of persons may irritate one or two." All we can do is to note dyes that have a bad record and Dr. Cox remarks that vat dyes are not often concerned in dermatitis cases.

Leather goods, and particularly hat bands, are suspect and seem to cause dermatitis by the agency of free amino compounds or soluble chromates. The accelerators and anti-oxidants used in the manufacture of rubber are potential irritants. It is disturbing to think how great is the danger from hair dyes, and particularly when the skin has been pierced. In Germany alone 10,000,000 packets of hair dyes are used annually, and give rise to about 320 cases of dermatitis, of which some 20 are severe. The very infrequency of the onset of the disease — if disease it should be called—provides one of the major difficulties of those who are endeavoring to combat it. It is a surprising fact that flour and sugar have been known to cause this irritation, and this may be partly due to ammonium persulfate. Soaps may set up serious irritation so that washerwomen may develop chronic dermatitis and eczema; caustic soda, phenols, cresols and perfumery bases may be dangerous if present in any quantity. Cosmetics, in particular, are applied under conditions which render it essential that only chemicals of proved harmlessness should be present, as, for example, in eyebrow pencils used when eyebrows have been plucked, for here the dye is introduced subcutaneously. Great care should be exercised in ascribing dermatitis to any particular substance, because once a case is recorded, even without proof, in the technical and scientific press, that substance is ever afterwards suspect.

It appears that dermatitis is not caused generally by complex substances, but that the intermediate compounds used in the manufacture of those substances seem to be more virulent. Body sweat seems to have the power of decomposing some complex substances with formation of harmful products. Inoculation of a person with a minute amount of dermatitis-producing chemical renders that person ever afterwards susceptible to that specific substance; hence some may work for years without being affected, and then may lose their immunity. Generally speaking, to produce dermatitis a substance must penetrate beneath the skin, or must affect the natural workings of the skin so as to cause irritation beneath it. It is thus highly important to avoid injury to the skin in the chemical factory. When all this has been taken into account, certain persons seem to have an idiosyncracy for the disease. To avoid dermatitis in industry, the greatest single step that could be taken would theoretically be to discover a test for this hypersensitiveness. Unfortunately, it seems that a test that reveals sensitiveness to one substance does not necessarily indicate sensitiveness or immunity to another substance. Cleanliness and frequent washing are the best methods of avoiding dermatitis in the factory, coupled with the wearing of suitable garments.

*Chemical Age (England).

PROCEEDINGS OF THE
American Association of Textile Chemists and Colorists
NOVEMBER 16, 1936

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Last Notice!

Banquet Reservations should be made with R. R. Farwell, c/o the Biltmore Hotel, Providence.

Annual Meeting and Convention

December 4 and 5

Providence, R. I.

The Determination of Wool and Mohair by Scale Size and Diameter

JOHN H. SKINKLE*

ONE of the most difficult determinations in textile microscopy is to decide with certainty whether a given sample of hair fiber is wool or mohair. In the case of a typical wool or a typical mohair, the identification is fairly easy on qualitative examination alone, the presence or absence of serrated outline being the most prominent distinction; in the cases of border-line samples, such as some of the carpet wools or the luster wools, the qualitative examination is uncertain; certain chemical treatments tend to alter the outlines of the fibers and make the determination even more uncertain; lastly, the coarser and more hairy fibers of both kinds are easily confused. A quantitative determination is usually more certain and requires less experience on the part of the observer. Hanausek† recommends the use of scale length in the identification of hairs and gives values for wool of 8.3 to 10.3 microns per scale and a single value of 18.9 microns for mohair, but in the author's experience these values are unreliable in the case of wool and insufficient in the case of mohair. This work was undertaken, therefore, to obtain information as to whether scale size is critical enough for identification, to extend the range of values, and to see whether any other measurement or group of measurements might aid in identification.

This paper is presented as a contribution from the Sub-Committee on the Separation of Fibers of which Mr. Skinkle is a member.

Mr. Skinkle's method has been carefully checked by other workers, and we quote from the report of one prominent textile laboratory which has made a special study of the separation of mohair and other animal fibers.

"We believe that Mr. Skinkle's method is a distinct contribution to laboratory procedure. We took what we consider the most difficult problem we have, used the proposed method and find that it does what is claimed."

It is hoped that others will try out this method, and Mr. Skinkle will welcome any criticism that may arise.

L. A. O.

According to Hanausek, the scale length of hairs is quite uniform except that it increases toward the tip of the fiber. In order to verify this, three widely differing wools and one mohair were tested for scale length and diameter at three places on each fiber, the average of ten to twenty fibers being obtained. The results of these measurements are given in Table I. It may be seen that two of the scale lengths always check and that in most cases the tip ends have lower scale lengths than the middle or root ends; this is contrary to Hanausek's statement. In the work subsequent to this, all measurements were taken near the middle of the fibers.

In determining the scale length and diameter of the various samples, determinations were made on twenty fibers mounted in mineral oil, but since each determination was made by noting the length of a series of several scales and then dividing by the number of scales, the total number of scales measured for each sample is from sixty to one hundred. The values obtained were quite uniform and so a larger number of determinations was not thought necessary. The diameters were measured at the same points as the scale length. The samples tested included carpet wools and luster wools since these are the wools usually confused with mohair. The values of scale length (S), diameter (D), and the value S^3/D are given in Table II.

From Table II, the following facts may be noted:—

1. S is above 18 for all mohairs and below 18 for all wools.

2. All but two wools are below 17 and all but two mohairs are 18.5 or above.

TABLE I

Effect of Position on Hair on Scale Size and Diameter

Sample	*Position*	*Diameter —microns*	*Scale length —microns*
Coarse wool	Root end	129	19.2
Coarse wool	Middle	105	17.9
Coarse wool	Tip end	93	17.8
South American wool	Root end	35.2	15.3
South American wool	Middle	36.3	15.5
South American wool	Tip end	27.5	13.2
Fine wool	Root end	29.8	15.7
Fine wool	Middle	27.5	15.2
Fine wool	Tip end	25.3	13.5
Mohair No. 1	Root end	43.4	18.9
Mohair No. 1	Middle	40.5	18.7
Mohair No. 1	Tip end	37.2	18.5

*Department of Chemistry, Lowell Textile Institute.

†Hanausek, T. F.—Winton, K. B., "Microscopy of Technical Products," John Wiley & Sons, Inc., New York, 1907.

TABLE II

Scale Sizes and Diameters of Various Wools and Mohairs

WOOLS:—	*D=diameter —microns*	*S=scale length —microns*	S^3/D
⅜ blood	31.0	12.7	66
Sicilian, washed	22.2	13.2	104
¼ blood	47.0	13.3	50
Coarse, 5's B.A.	41.2	14.4	73
Alleppo, Syria	38.3	14.6	81
China boll	20.3	15.0	166
English luster	38.6	15.0	88
Fine	27.5	15.2	128
South American	36.3	15.5	103
Luster	42.3	16.8	108
New Zealand cross-bred	37.0	17.2	138
Very coarse	105.0	17.9	55
MOHAIRS:—			
Low, stained	36.8	18.1	161
Mohair No. 2	35.9	18.2	168
Mohair No. 3	27.3	18.5	232
Coarse	44.2	18.5	143
Mohair No. 1	40.5	18.7	161
Mohair beards	59.7	19.1	117
Cape Kid	39.4	20.2	209
Super Kid	28.6	21.6	352

3. S^3/D is below 140 for all wools except one, and above 160 for all mohairs except two.

In the identification of a hair as either wool or mohair, the following cases may exist:

A. The value of S is below 17.0; the hair is wool.

B. The value of S is above 18.5; the hair is mohair.

C. The value of S is between 17.0 and 18.0; the hair is probably wool, verify by calculating S^3/D, if this value is below 140 the hair is wool.

D. The value of S is between 18.0 and 18.5; the hair is probably mohair, verify by calculating S^3/D, if this value is above 160 the hair is mohair.

As yet, no cases have arisen in the experience of the author or his students which do not fall into one of the above classes but it is possible that wools may turn up with a value of S slightly above 18 but with a value of S^3/D or less than 140; such cases might cause revision of the border-line values quoted above.

ANNUAL SUMMER OUTING, SOUTH CENTRAL SECTION

THE annual Summer outing of the South Central Section of the American Association of Textile Chemists and Colorists was held at Signal Mountain Hotel, on August 14th and 15th. Many guests were present from the Piedmont Section as well as from the Southeastern Section.

The meeting was one of the best that has been held in this section, and the consensus of opinion, of those present, was that next year would see an even larger gathering.

Approximately 175 were in attendance, including members and their friends, and the textile industry was well represented.

W. E. Hadley, Chairman of the South Central Section, was official host. The success of the Outing was due largely to the untiring efforts of Mr. R. S. Wheeler and Mr. Robert Cowan who had charge of general arrangements.

Beginning Friday afternoon, music was furnished in the Sunken Gardens. and beer and pretzels seemed to be in order. Swimming and diving contests were held in the outdoor pool. Throughout the evening dancing was enjoyed in the Hangar.

During Saturday games and contests were enjoyed by a large number of the members. Golf, Skeet Shooting, Shuffle Board, and Tom Thumb Golf were among the diversions.

A well attended banquet Saturday evening climaxed the outing.

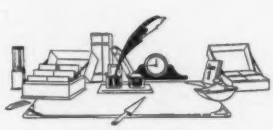
A. R. Thompson Jr., Vice President of the National Association, acted as Master of Ceremonies.

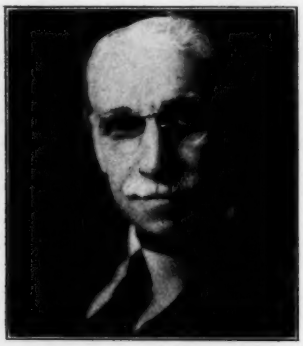
Throughout the evening Van Arsdales Orchestra furnished music for the Banquet and Dancing. A floor show was greatly enjoyed during the Banquet.

During Saturday morning, the Mercerizing Committee held a meeting which was well attended. Mr. Sidney Edelstein, who is conducting valuable research work for the Association, spoke at some length regarding the progress which is being made along this line.

Respectfully submitted,

MURRAY B. SMITH, *Secretary.*





LOUIS A. OLNEY
President Emeritus
Chairman of Research Committee

WM. R. MOORHOUSE
Treasurer

ARTHUR R. THOMPSON, JR.
Vice-President

ANNUAL M
AND CONV

PROGRAM

FRIDAY, DECEMBER 4

10:00 A.M.—Registration in Foyer of Providence-Biltmore Hotel.
1:30 P.M.—One hundred tenth Council Meeting.
2:00 P.M.—Sight-seeing Trips—Cars Furnished.
2:30 P.M.—One hundred third Meeting of Research Committee.
6:30 P.M.—Buffet Supper in Foyer of Providence-Biltmore Hotel.
7:45 P.M.—Official Opening of Convention.
7:50 P.M.—Technical Program.
9:30 P.M.—Entertainment.

SATURDAY, DECEMBER 5

9:30 A.M.—Technical Program.
12:00 M.—Business Meeting.
Annual Reports of Officers and of Committee Chairmen; Election of Officers and Other Business.

———— Recess for Luncheon.
2:00 P.M.—Technical Program.
7:00 P.M.—Banquet. (Dress Optional.)
Toastmaster: A. R. Thompson, Jr.

Speakers:
His Excellency, Theodore Francis Green, Governor of Rhode Island.
Hon. James E. Dunne, Mayor of Providence.
Mr. William H. Cady.
Professor L. A. Olney.
Mr. John Nicol Mark.

Tentative Technical Program

A. W. BUHLMANN, of A. W. Buhlmann, Inc.—"Are We Making Any Progress in the Textile Industry?"

DR. A. C. HARDY, of Massachusetts Institute of Technology—"The Applicability of Spectrophotometry to the Solution of Color Problems in the Textile Industry."

GEO. V. CAESAR, of Stein, Hall & Co.—"Fundamental Properties of Starches."

DR. SIVERT N. GLARUM, A. A. T. C. & C. Research Associate at Brown University—"The Measurable Properties of Printing Pastes and Thickeners."

DR. HERBERT A. LUBS, of E. I. du Pont de Nemours & Co.—"The Chemistry of the Stabilized Azoic Dyes."

BERNICE E. JAMEISON, of Rhode Island School of Design—"Art in Textile Designing."

JOS. E. GOODAVAGE, of Republic Steel Corporation and Philadelphia Textile School—"The Suitability of Stainless Steel Compared with Other Metals in Bleaching."

GEO. W. HINKLE and CURTIS C. SNYDER, of Republic Steel Corporation—Moving Pictures of Manufacture and Application of Stainless Steel.

PROVIDENCE, R. I.

MEETING
NVENTION

DR. CROSSLEY, of Calco Chemical Co.—Subject to Be Announced Later.

DR. WALLACE R. BRODE, of Ohio State University—"Relation of Structure to the Light and Wash Fastness of Dyes."

DR. MILTON R. HARRIS, A. A. T. C. & C. Research Associate, at U. S. Bureau of Standards—"Reactive Groups in Wool and Their Industrial Significance."

SIDNEY M. EDELSTEIN, A. A. T. C. & C. Research Associate, at University of Chattanooga—"Methods for the Study and Control of Mercerization."

L. T. HOWELLS and F. H. GUERNSEY, of Cowles Detergent Co.—"The Evaluation of Chemical Tendering of Cellulose by Cellulose Viscosity Measurements."

ROHM & HAAS—Subject and Speaker to Be Announced Later.

COMMITTEES

General Chairman—ALLISON R. FELTCHER, Franklin Process Co.
Vice-Chairmen—JOHN G. MASSON, Rosemont Mill, Guerin Mills, Inc., Woonsocket, R. I., and
WILLIAM H. CADY, U. S. Finishing Company, Providence, R. I.

RESERVATIONS AND REGISTRATION

Chairman—ROBERT R. FARWELL, DuPont Company, Providence.
A. NEWTON GRAVES, Franklin Process Co., Providence.
RAYMOND A. PINGREE, U. S. Finishing Co., Providence.

PUBLICITY

Chairman—THORWALD LARSON, Calco Chemical Co., Providence.
BRACKETT B. FERNALD, U. S. Oil Co., Providence.
J. ALBERT PAWSON, Bradford Dyeing Association, Bradford.
WALTER S. WILLIAMS, Mount Hope Finishing Co., North Dighton.
HECTOR C. BORGHETTY, Aspinook Co., Jewett City, Conn.

ENTERTAINMENT AND SOUVENIR

Chairman—FRANK L. MCCOOL, Sandoz Chemical Works, Providence.
HERBERT KUHL, Carbic Color & Chemical Co., Providence.

RECEPTION

Chairman—RICHARD HAWORTH, Richard Haworth, Inc., Providence.
H. J. DAIGNEAULT, Biltmore Hotel, Providence.
WILFRED A. LORD, General Dyestuffs Corp., Providence.

SIGHT-SEEING

Chairman—NORMAN D. HARVEY, JR., 64 Keene Street, Providence.
CARROLL W. PECK, George Mann & Co., Providence.
THOMAS H. ROBERTS, Arnold & Hoffman, Providence.

BANQUET ARRANGEMENTS

Chairman—RALPH CULVER, Ciba Company, Providence.

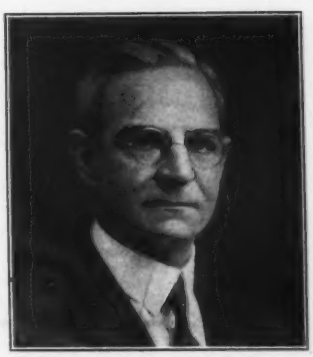
TECHNICAL PROGRAM

Chairman representing National Council—CARL Z. DRAVES, Ludlow Manufacturing & Sales Co., Ludlow, Mass.

DECEMBER 4 and 5

WM. H. CADY
President

HAROLD C. CHAPIN
Secretary



ELMER C. BERTOLET
Vice-President

PROPOSED AMENDMENTS TO THE CONSTITUTION

AT the 109th Council meeting, on Friday, October 16th, 1936, there were proposed the following amendments to the Constitution of the Association, designed, it was explained, to permit holding the usual annual general meeting of the Association at any date in each year chosen by the Council; changing the Constitution in other respects only to keep the election of officers strictly annual in November by mail ballot, as at present, rather than shifting to accord with possibly shifting annual meeting dates.

Proposed Amendments

Article VIII. Change the first sentence of paragraph 1 to, "In each year, as herein provided, there shall be elected a President, two Vice-Presidents, a Treasurer, and as many Councilors-at-Large as may be required to bring their total number to six." In paragraph 2 substitute for sentences 2 and 3, "Two Councilors-at-Large shall be elected in each year to serve three years, and others may be elected if necessary to complete three years terms left incomplete by resignation or otherwise." For paragraphs 4, 5, and 6 substitute, "The Secretary shall mail to every Active member, by November 15th a ballot bearing the name of every nominee. Ballots marked and returned to the Secretary by December 15th shall elect officers for terms beginning January 1st. An executive office left vacant for any reason may be filled temporarily, until the next annual election, by vote of the Council."

Article IX. For the second sentence of paragraph 1 substitute, "At each general meeting it shall present a report of its proceedings since the last preceding general meeting."

Article XII. For "annual meeting" substitute "general meeting."

Signed by WM. H. CADY, H. MEYER, ROBERT E. ROSE, E. H. KILLHEFFER, W. R. MOORHOUSE, CHAS. H. STONE, D. H. POWERS, LOUIS A. OLNEY, GEORGE A. MORAN and ELMER C. BERTOLET.

At the 109th Council meeting there was proposed also the following amendment, for the stated purpose of permitting Sections to collect and expend for their own uses sums outside their allowances from the general treasury; this being current practice, though apparently contrary to the present wording of the Constitution. It was further designed to confine Section Treasurer's reports to the national body, to those funds received from the national body.

Proposed Amendment

Article XV. For paragraphs 5 and 6 substitute, "From the general treasury of the Association, to meet its expenses, each Section may request through the Secretary of the Association in any calendar year, sums not exceeding a total of one dollar for each Active, Junior and Associate member in the Section with dues to the general treasury paid in full on March 1st of that year. On receiving such request, signed by the Chairman and Treasurer of the Section, the Secretary of the Association shall certify the amount allowable to the Section, in writing to the Treasurer of the Association, who shall then pay the amount requested and allowable, to the Treasurer of the Section. Each Section shall submit annually through its Treasurer, to the Secretary of the Association, a report itemizing receipts from the general treasury and expenditures therefrom; and any allowance to a Section under the provisions of this article shall be conditional upon the receipt of such report from the Section within one year previous to the request for funds. No Section shall incur at any time, in the name of the Association, net indebtedness in excess of the amount allowable to the Section under this article of the Constitution, except as may be authorized by specific vote of the Council."

Signed by E. H. KILLHEFFER, WM. H. CADY, H. MEYER, W. R. MOORHOUSE, CHAS. H. STONE, LOUIS A. OLNEY, GEORGE A. MORAN, R. E. ROSE, D. H. POWERS and J. ROBERT BONNAR.

These proposals will be presented at the Annual Meeting on December fifth, in accordance with the Constitution.

HAROLD C. CHAPIN.
Secretary.

CALENDAR OF COMING EVENTS

Meeting, New York Section, Chemists' Club, New York City, November 20, 1936.

* * *

Annual Meeting, Providence, R. I., December 4 and 5, 1936.

Abstracts of Papers

To Be Presented at Annual Meeting

The Applicability of Spectrophotometry to the Solution of Color Problems in the Textile Industry

ARTHUR C. HARDY

Professor of Optics and Photography, Massachusetts Institute of Technology, Cambridge, Massachusetts

The results of spectrophotometric analysis are useful (1) because they enable fundamental color standards to be maintained and (2) because they facilitate the interpretation of the facts of color mixture. Until the advent of spectrophotometry, color standards could not be maintained over long periods of time. It has therefore been impossible to accumulate an extensive and accurate body of knowledge concerning the diverse phenomena of color. This is now possible because spectrophotometric results depend merely on the measurement of quantities and wavelengths of light and do not require the maintenance of material standards.

The interpretation of the facts of color mixture and other color phenomena is simplified by the use of spectrophotometry, primarily because a spectrophotometer is an analytical instrument, whereas the human eye is not. All colors of practical importance transmit or reflect the various components of the visible spectrum in a characteristic manner. A spectrophotometer evaluates these components one at a time, whereas the human eye responds to the mixture of the components in a complicated manner. The concepts of spectrophotometry frequently suggest procedures that otherwise could not be formulated. A case in point is the "whitening" of textile materials having a yellowish cast. By the use of spectrophotometry, the characteristics of the dye or pigment that will neutralize the yellow hue with the least sacrifice in brightness is readily determined.

Through the establishment of an international standard of white light and a standard observer, spectrophotometric results may now be converted into values of brightness, dominant wavelength, and purity. In other words, the gap between spectrophotometry and colorimetry has now been closed.

Fundamental Properties of Starch

G. V. CAESAR

Laboratory Director of Stein, Hall & Company, Inc.

In the scientific study of starches, much that has heretofore passed as knowledge must be unlearned. The literature (with some exceptions, notably the publications of the late T. C. Taylor) has been dominated by certain European concepts which have over-stressed chemical aspects to the almost complete disregard of physical aspects.

In the present lecture, attention is concentrated upon the all-important physical makeup of the starch granule and the interesting and commercially useful properties which flow from it. The organization of the granule is illustrated by lantern slides of drawings and photomicrographs, and the physical properties of starch gelatinization are shown in lantern slides of "Consistometer" charts. The pasting properties of eight starches are compared on one chart.

It is demonstrated that the physical state of organization of the starch granule is more nearly related to the pasting properties of starch than are variations in the so-called "amylopectin" content. Attention is called to the extreme looseness with which this term, "amylopectin," is defined.

The Measurable Properties of Printing Pastes and Thickeners

DR. SIVERT N. GLARUM

A. A. T. C. & C. Research Associate at Jesse Metcalf Laboratory of Brown University

A method of measuring the flowing properties of printing pastes as well as the pastes used in preparing them will be described. These measurements permit the accurate comparison of pastes for such qualities as "body," "false body," "length," "shortness," etc., which have previously been very indefinite terms. These measured properties show a very direct relation to printing qualities. The characteristic flowing properties of a wide variety of thickening materials will be shown.

The Chemistry of the Stabilized Azoic Colors

DR. H. A. LUBS

Associate Director, Technical Laboratory, E. I. du Pont de Nemours & Co.

The stabilized azoic dyes are defined as mixtures of a stabilized aromatic diazo body with a coupling component such as a β-hydroxynaphthoic acid anilid derivative. The historical development of this group of cotton printing colors is discussed. The more important stabilizers are described and various combinations for obtaining desirable shades are mentioned. The reactions involved are illustrated by an experimental demonstration showing the several steps in the development of the final color.

The Suitability of Stainless Steel Compared with Other Metals in Bleaching

JOS. E. GOODAVAGE

Philadelphia Textile School, for the Republic Steel Corporation of Massillon, Ohio

Stainless steel has been compared with other metals in its effect on the stability and activity of peroxide and hypochlorite bleaching baths.

The loss of weight of different metal containers and the amount of metal appearing in solutions of the various bleaching agents have been determined.

The Influence of Structure on the Dyeing and Color Properties of Mono-azo Naphthol and Naphthylamine Sulfonic Acid Dyes

DR. WALLACE R. BRODE and DR. MARION E. GRIFFITH

Ohio State University

A series of dyes has been prepared in which aniline, orthanilic acid, metanilic acid and sulfanilic acids have

been diazotized and coupled to alpha and beta naphthol, and naphthylamine and the available mono sulfonated naphthols and naphthylamines. These dyes have been purified by the guanidine method. Their absorption spectra has been observed in both the visible and ultra-violet regions of the spectrum. Dyed swatches have been prepared and samples have been subject to accelerated washing and fading tests. The effects of washing and fading have been measured through the reflection spectrum of the samples and comparison with the reflection spectrum of the original samples of the dyed fabric. From these data it has been possible to classify the dyes, to indicate the possible structure of unknown dyes of similar character and predict the dyeing properties of such dyes. Measurements were also made on the exhaustion properties of the isomeric dyes. Di and trisulfonated naphthol and naphthylamine dyes have been prepared but insufficient data is available to predict or correlate the results.

The problem is a portion of a wider program involving the study of the influence of position of substitution and character of the substituent group on the absorption spectra and dyeing properties of dyestuffs. Included in this work are such series as the indigo, thio indigo, disazo, mono-azo, phthalein and phthalocyanine dyes, upon which data have been obtained and published in part.

The Reactive Groups in Wool and Their Industrial Significance

DR. MILTON HARRIS

A. A. T. C. & C. Research Associate at National Bureau of Standards

The purpose of this talk is to discuss the reactive groups in wool, the methods which have been developed for their quantitative estimation, and their relationship to practical wool processing.

From the standpoint of the physical stability of the wool fiber, the disulfide groups are of extreme importance. They are readily attacked by light, alkalies, and oxidizing and reducing agents. Any reagent which will alter the state of the disulfide groups will alter or destroy the physical structure of the fiber. The methods which were worked out for the study of the oxidation of these groups may be utilized in the control of practical bleaching and chlorination and bromination processes.

The basic groups (amino and guanidine groups) in wool account for the absorption of acids and acid dyestuffs whereas the acidic groups (carboxylic acids) account for the absorption of alkalies and basic dyestuffs. Under suitable conditions, both types of groups are determined by direct titration. The basic groups may react with sulfuric acid in two ways: namely, to form a reversible combination which facilitates acid dyeing and an irreversible combination which inhibits acid dyeing and produces the resist often obtained in the carbonizing process.

Methods Used in Research on Mercerization

SIDNEY M. EDELSTEIN

A. A. T. C. & C. Research Associate at University of Chattanooga

The paper will discuss critically methods which have been used for carrying out and controlling mercerization in the laboratory and methods for examining the luster, dye affinity and chemical reactivity of mercerized material.

The discussion will include the following:

(1) A description of the machines used by the writer for preparing large mercerized samples of yarn under widely different conditions and the means of controlling the tension and stretch on these samples during mercerization.

(2) A correlation of recent work on the Barium Activity numbers of mercerized material.

This work has shown that in many cases, the determination of Barium Activity numbers indicates the condition and previous treatment of the samples in addition to the presence of mercerization.

(3) The evaluation of dye affinity by the pyridine method which determines quantitatively the amounts of direct dyes on small mercerized samples; and the evaluation of dye affinity by visual examination of dyed fabrics prepared from mercerized samples. The advantages and disadvantages of both methods will be described as well as the conditions under which the use of each is most suitable.

(4) The visual examination of mercerized material for luster and luster measurements by means of a photoelectric instrument.

(5) Miscellaneous factors and methods of interest in the study of the mercerization process.

The Evaluation of the Chemical Tendering of Cellulose by Cellulose Viscosity Measurements

F. H. GUERNSEY and L. T. HOWELLS

Cowles Detergent Co., Cleveland, Ohio

The chemical processing of cotton (cellulose) fiber, such as kier boiling, bleaching, scouring, mercerizing, dyeing, etc., results in some degree of cellulose degradation or formation of cellulose derivatives.

The ordinary routine measurement of such degradation is effected by means of the mechanical grab test and is reported as tensile strength losses.

Tensile strength loss is a mechanical test showing the composite effect of all positive and negative factors of strength involved. These include fiber length, degree of twist, weaving effects (floats, etc.) and defects, strains due to tension, and the chemical condition of the fiber. The mechanical grab test does not differentiate between the mechanical and chemical condition of the yarn or fabric.

From the standpoint of process control, production of quality, and market specifications, it is essential that the composite index, "Tensile Strength," should be dissected and its various elements considered in their own light insofar as possible.

An application of the solubility characteristics of cellulose in cuprammonium solution has been made to this problem and a reliable quantitative method of measurement of chemical degradation is now available for commercial practice.

Chemical tendering is accurately reflected in the viscosity or fluidity of the cuprammonium solution in which a sample of the cellulose has been dissolved.

The method permits accurate control of each process step and establishment of standard specifications as to the chemical condition of the cellulose in finished goods.

AMERICAN
DYESTUFF REPORTER

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Vol. 25 November 16, 1936 No. 23

ANNUAL MEETING

AS this is the last issue of the REPORTER which will reach you before the Annual Meeting of the American Association of Textile Chemists and Colorists convenes in Providence, R. I., on December 4th, we wish to take this opportunity of again reminding the Association members of the value to be derived from attending this meeting. We call your attention to the program which appears in this issue as well as the abstracts of many of the papers to be presented which also appear in the Proceedings of this issue. It is evident from a perusal of these items that an excellent meeting has been arranged by the committees who have been at work the past months in completing the details. As the real value of any such meeting is dependent of course upon the type and quality of program that has been prepared, it is only necessary for you to look over the program as published to convince yourself of the desirability of being among those present.

The usual excellent program of papers has been arranged by the chairman of the technical program committee and there will be an opportunity for open discussion following the presentation of each paper. There will also be reports of the sub-committees working under the research committee, annual business meeting, council and research committee meetings, announcement of election results and other matters that come before the annual meeting.

In addition to the technical features arrangements have been made for other entertainment, including the smoker Friday evening, the banquet Saturday evening, trips to nearby plants during the day, etc.

We are informed that at the present time more than 600 persons have made reservations and indications are that there will be an even greater number present when the meeting actually begins.

Remember the date—December 4th and 5th, and the place—Hotel Biltmore, Providence, R. I.

FIRST ANNUAL PROCESSING REVIEW NUMBER

THE November 30th issue of the REPORTER will constitute the first annual processing review number of this publication. Appropriately enough, it will appear just preceding the sixteenth annual meeting of the American Association of Textile Chemists and Colorists which, you will agree, should be an ideal time. The purpose of this issue is to present a complete review of the new developments which have taken place during the past year in the textile wet processing field. In accordance with this purpose, we have had authorities in the various branches of wet processing prepare special articles reviewing the past year's developments. In addition we are presenting a description of new products intended for use in our industry which have been introduced during the past year.

We believe the information contained in this issue will be extremely valuable to our readers and that it will constitute an important contribution to the year's published technical information. We wish to impress upon you that this is not just another "special issue" but rather an issue which has a definite purpose in mind: to combine in one issue complete information regarding the past year's developments in textile wet processing. We think we have done a creditable piece of work in assembling this information but, as you will be the judge, we should like to have your comments on this issue when it appears.

JAMES T. SKELLY

JAMES T. SKELLY, vice-president and director of the Hercules Powder Co., died at Wilmington, Del., on Saturday, October 31st, following an illness of six weeks. He was well known in the explosives-consuming industries to which he had devoted 44 years of service.

ANNUAL MEETING AND CONVENTION

A. A. T. C. C.

DECEMBER 4 and 5

PROVIDENCE, R. I.

FIRST ANNUAL
PROCESSING REVIEW NUMBER
ISSUE OF NOVEMBER 30TH

Silver for Dyestuffs Plant

C. H. S. TUPHOLME

UNTIL recent years the applications of silver to plant construction, either as a pure metal or an alloy, have been relatively small but recently it has rapidly come forward, especially in Britain and on the continent, and is now receiving a considerable amount of attention. The properties which make it attractive are: its freedom from oxidation, resistance to various commercial acids, remarkably high thermal and electrical conductivities, and excellent mechanical characteristics.

Fine silver is now commercially available as sheets of all gages down to thin transparent, hand-beaten foil; tubes of all diameters, either welded or, up to about 2 in., seamless drawn; and wire, either rolled, or drawn down to 0.0005 in. From the last, gauzes of any mesh can be woven, and from tubes and sheet many kinds of apparatus fabricated. The metal can be joined either by autogenous welding or by soldering with a silver solder, an alloy of the silver-copper series with or without an addition of zinc, but this latter method is not desirable if the product has to withstand corrosion.

The solder, containing as it does considerable amounts of copper, is much weaker than the main body of the article, and is likely to give rise to electrolytic action. Autogenous welding is therefore employed for practically all chemical purposes, but this is a very delicate operation, since the high thermal conductivity of the metal increases the difficulties of local melting, and when molten the absorption of oxygen must be dealt with, or there will inevitably be embrittlement and blistering on solidification. Fortunately the more important bullion refiners have been able satisfactorily to surmount these difficulties, and welded apparatus can be obtained in which the weld can be made as strong, both mechanically and chemically, as any other part of the article. Before placing orders for the manufacture or repair of silver plant, chemical engineers should assure themselves that the firms have the requisite knowledge and skill, for unskilled attempts to weld the metal will almost inevitably result in ruining it.

Castings are not very often called for on account of the high price of the metal, but sound ones can be and have been made, both in the fine metal and in its alloys, up to 2 cwt. in weight. If larger castings are ever required, no doubt a special technique will have to be evolved on account of the danger of oxygen-absorption, but there is no reason to think that this is impossible.

The most extensive application to chemical plant evident so far is in the condensation and general handling of acetic acid, which is particularly corrosive at the moment of condensation. This may be due to the co-operative action of finely divided acid and oxygen, and has given very great trouble to the manufacturers who usually use copper condensers.

According to Donald McDonald, who discussed this question at a meeting of the Society of Chemical Industry, some of these are large pieces of plant weighing several hundredweight, and are of both the tubular and the coil types, the tubes being welded or, if not too large, seamless solid drawn. The heat transmission is excellent, and, on account of its superior thermal properties, a silver condenser can be considerably smaller than a copper one designed to do the same work. Since silver possesses a low specific heat, a fairly high coefficient of expansion, and high thermal conductivity, the apparatus will expand rapidly on the application of heat, and in some cases special arrangements must be made to allow this to take place without giving rise to buckling.

In the manufacture of acetate rayon silk fine silver condensers are utilized in the recovery of solvents; while the organic solutions employed require valves, cocks, and taps made from silver alloys. The viscose industry, on the other hand, is not a congenial home for silver on account of its sulfurous nature. In the manufacture of synthetic acetic acid silver is used as a catalyst in the form of fine wire mesh to promote the oxidation of ethyl alcohol to acetaldehyde. It is also used in the distillation of phenol.

Not only is the pure metal used and, to a less extent, its copper alloys, but also what is known as doublé, in which fine silver sheet is rolled on to copper or other base metal, thus reducing the first cost of the apparatus. Pipe lines can be made in this way by drawing a tube of the base metal over a seamless tube of silver, the combination being sufficiently strong to withstand complete vacuum without separation. The outer tube can be made of suitable thickness to stand high internal pressures. Coils for heating corrosive liquors also can be made in the same way, but with the silver outside. Small vessels can be made of the doublé sheet quite satisfactorily, but with larger sizes jointing difficulties arise which rather limit its application.

In considering the use of silver for the fabrication of process plant, certain fundamental facts must be borne in mind. Sterling silver—a phrase which to many represents an ultimate standard of purity—is 92.5 per cent pure. Such silver is no real safeguard against corrosion, and in most cases is unsuitable for plant construction.

The purity of electrolytic silver exceeds 99.97 per cent, since it is refined by a particular electrolytic process which ensures optimum purity and therefore maximum resistance to corrosion.

Electrolytic silver by virtue of its ductility possesses the great advantage of application to existing plant. As a simple example of this, consider an ordinary jacketed copper boiling pan. A thin lining sheet of electrolytic silver is worked into the pan in such a way that it is entirely and intimately united with the copper vessel.

Many forms of existing plant can be similarly treated, the limits of application of the process being mainly those of accessibility.

Condensing surfaces, whether interior or exterior, can be provided with a homogeneous covering of electrolytic silver which affords complete protection against corrosive vapors and condensates. Cooling and heating coils and tubes can be made in copper with electrolytic silver lining or sheaths.

Thus from beginning to end of any process the plant at all critical points can be rendered immune to corrosive attack by the tabulated reagents by the employment of electrolytic silver—which is a pure homogeneous metal as distinct from an electrolytic coating which is invariably porous.

For the construction of plant working under vacuum the process gives perfect results owing to the nature of the bond between the basic metal plant and its silver lining.

So advantageous indeed is silver to the industrial world that it can no longer be considered only as a precious metal. Its primary claims for installation are longevity in use, therefore optimum efficiency of plant and the absence of contaminative effect upon the product manufactured. Furthermore, it is a fact that electrolytic silver, as distinct from any other industrial material has a permanent investment value (in other materials conventionally recognized as "scrap value") of 50 per cent to 75 per cent of the original cost of the plant.

Electrolytic silver is found to behave as follows when in contact with the materials listed:

Acid	*Electrolytic Silver*
Acetic Acid	Unattacked.
Acetic Acid Vapor	Unattacked.
Boric Acid	Unattacked.
Formic Acid	Unattacked.
Hydrochloric Acid (concentrated)	Attacked.
Hydrochloric Acid (dilute)	Unattacked.
Lactic Acid	Unattacked.
Mixed Acid (Nitric-Sulfuric)	Attacked.
Nitric Acid	Attacked.
Oleic Acid	Unattacked.
Oxalic Acid	Unattacked.
Phosphoric Acid	Unattacked.
Sulfuric Acid (over 60 per cent hot)	Attacked.
Sulfuric Acid (under 60 per cent)	Unattacked.
Acetic Anhydride	Unattacked.
Reagent	*Electrolytic Silver*
Acetone	Unattacked.
Alum	Unattacked.
Aluminum Sulfate	Unattacked.
Ammonia	Unattacked.
Ammonium Chloride (cold)	Unattacked.
Ammonium Chloride (on boiling in air)	Very slightly attacked.
Ammonium Sulfate (sat.) + 5% Sulphuric Acid	Unattacked.
Bleaching Powder	Attacked.
Bromine	Attacked.
Carbon Tetrachloride	Unattacked.
Chlorine Gas	Attacked.
Copper Chloride (on boiling)	Attacked.
Copper Chloride (cold)	Unattacked
Copper Sulfate (10%) + 2% Sulfuric Acid	Unattacked.
Ether (Ethyl)	Unattacked.
Ethyl Chloride	Unattacked.
Formaldehyde	Unattacked.
Iodine in Potassium Iodide	Attacked.
Iodine Solutions	Unattacked.
Magnesium Chloride	Unattacked.
Magnesium Sulfate	Unattacked.
Salt (ordinary)	Unattacked.
Sodium Chloride	Unattacked.
Sodium Hydroxide	Unattacked.
Sodium Sulfate	Unattacked.
Sodium Sulfide	Attacked.
Sodium Thiosulfate	Unattacked.
Water (tap-water)	Unattacked.
Zinc Chloride	Unattacked.

Soap Quality

A. H. PETTINGER

A SPANISH Royal Decree has defined the nature and characteristics of Castile Soap, the aristocrat of the detergent world. It may not be without interest to compare the standards laid down with the U. S. Federal Specifications for Ordinary Laundry soap. It is true that no textile manufacturing concern would use Castile soap in the scouring department but there is nothing lost by making a study of soap quality in general. When it is realized that the textile industry uses some twenty-five to thirty million dollars worth of soap yearly, the necessity for some sort of definition of soap requirements is cleared.

Castile soap is the product of saponification of good quality olive oil with caustic soda. The substance is white, soft to the touch, of agreeable scent and of a slightly alkaline taste, soluble in water and alcohol without leaving residue. The iodine value of the fatty acids shall be 69 to 82 (Hubl). The oleorefractometric degree of the acids shall be between 41 and 43 at 40° C.

Laundry soap says the U. S. Specification P-S-591, shall be made from soda and fats, with no excessive proportion of rosin and a moderate amount of material insoluble in alcohol. It shall be free from makeweights, and shall be suitable for use with moderately hard water for general cleaning. The odor shall not be objectionable, as received or when made into a hot solution. The sum of free alkali, total matter insoluble in alcohol and sodium chloride, shall be not less than 2 per cent nor more than 10 per cent. Rosin shall not exceed 25 per cent.

Below are set out certain figures of Castile and Laundry soap in order to aid comparison:

	Castile Soap	*U. S. Specification*
Water content (upper limit)	20	36 per cent
Free alkali	0.3	0.5 per cent
Matter insoluble in water	none	1.0 per cent

The British Government lays down the following standards for laundry soap, resin free: It shall contain no resin or cottonseed oil and no fishy odor shall be developed within 12 months of delivery. Bar soap shall contain not less than 63 per cent of fatty acids. Total impurities shall not exceed 0.75 per cent. On free alkali the limits are keen; total free alkali as Na_2O shall not exceed 0.3 per cent, of which free caustic, as Na_2O shall be less than 0.1 per cent of the soap.

There are other important criteria as far as textile soap is concerned which are not covered by the above specifications. Thus for wool scouring it is desirable that the fatty acids of the soap should not have a high melting point and show inclination to set easily in cold weather. The behaviour of a soap to oxidation influences is particularly vital if a residue is to be left on a fabric afterwards. In this connection it is useful to note that aftersmell in scoured pieces can sometimes be traced to magnesium soaps; thus while the lime soap may be relatively free from this defect, the magnesium soap of the same may be at fault.

Some soap users may object to the employment of filling material in soap but certain additions may be helpful. Thus Carter and Stericker report that silicate of soda is useful in washing fabric in temporary-hard water in that it aids the soap to fulfil its function to the full. An interesting patent to Henkel and Co., relates to the addition of potassium acetate or potassium lactate to soap which will then remain liquid at low temperatures.

Perhaps the safest standpoint towards "fancy" soaps is to remember that the addition of extras is best done by the chemist or the scourer when there is call for some special alteration, rather than pay a high price for prepared soaps containing dubious auxiliary compounds and use them all the time. It is then possible to buy in a very wide market and since the soaps offered are all cheap, comparison is relatively simple and adulteration quickly detected.

Erratum

"The Objective Specification of Color" and "Color Tolerance: Its Measurement and Specification for Dyed Textiles"

R. D. NUTTING

The author wishes to take this opportunity for correcting several errors that appeared in the two previously published articles of this series*.

The article titled, "The Objective Specification of Color," appearing in the AMERICAN DYESTUFF REPORTER *24*, No. 21, Oct. 21, 1935, contains an error on page 589 in that the multiplying factors for $\Sigma\bar{x}E_eR\Delta\lambda$ and $\Sigma\bar{z}E_eR\Delta\lambda$ were reversed. This should read, ". . . it is necessary to multiply $\Sigma\bar{x}E_eR\Delta\lambda$ by 0.9804 and $\Sigma\bar{z}E_e\Delta\lambda$ by 1.1218 for Illuminant C." This error was carried through the worked sample in Table I on page 589 and the multiplication of the sums and following computations should be changed to read as follows:

		Standard		*Offshade*
$0.9804\ (\Sigma\bar{x}E_eR\Delta\lambda)$	=	717.5		706.5
$1.1812\ (\Sigma\bar{z}E_eR\Delta\lambda)$	=	321.2		188.0
$(\Sigma\bar{x}E_eR\Delta\lambda + \Sigma\bar{y}E_eR\Delta\lambda + \Sigma\bar{z}E_eR\Delta\lambda)$	=	1621.0		1463.0
x	$= \left(\frac{717.5}{1621}\right) =$	0.442	$\left(\frac{706.5}{1463}\right) =$	0.483
y	$= \left(\frac{582.3}{1621}\right) =$	0.359	$\left(\frac{568.5}{1463}\right) =$	0.389
z	$= \left(\frac{321.2}{1621}\right) =$	0.199	$\left(\frac{188}{1463}\right) =$	0.128
x + y + x	=	1.000		1.000

These computation changes result in the following values of Dominant Wavelength and Excitation Purity in the table on page 585. The Brightness values are unchanged.

	Dominant Wavelength	*Excitation Purity*
Standard	593.0	46.9
Offshade	589.6	65.9

*The third in the series appeared in the November 2nd issue.

Figure 2 on page 585 was drawn from the previous erroneous data and should be disregarded entirely.

The article titled, "Color Tolerance: Its Measurement and Specification for Dyed Textiles," appearing in the AMERICAN DYESTUFF REPORTER *25*, 1 (1936), contains several errors in Table I on page 3.

The correct values that should be substituted in Table I are given as follows:

Sample Designation	Tristimulus Values $\Sigma\bar{x}E_cR\Delta\lambda$	$\Sigma\bar{y}E_cR\Delta\lambda$	$\Sigma\bar{z}E_cR\Delta\lambda$	Sum	Trichromatic Coefficients x	y	Dominant Wavelength in Millimicrons	Excitation Purity in Per Cent	Brightness in Per Cent
Pink							500.6C	5.77	
Pink							502.7C	5.54	
Black	22.02	22.42	23.82	72.56	.303	.309	477	3.5	2.24
Black	24.32	24.24	30.89	79.45	.306	.305	563C	4.7	2.42
Navy									3.01
Navy									3.60
C									6.27
C									6.36
D									1.90
D									2.03

The Handling Processes

G. L. ATKINSON

PERHAPS the most important operations to any textile concern, are those processes known as the handling processes i.e. those processes which affect the condition of the cloth. These are not so numerous as might be imagined, for many of the processes in the dyeing and finishing section of the textile industry, are purely mechanical, and have little or no effect upon the condition of the cloth, that is a beneficial effect, and are utilized solely for achieving certain effects with regard to the fabric, such as hydro-extracting, by means of which surplus water is expelled from the cloth after dyeing, and so assisting drying, but having no effect whatever upon the cloth, with regard to handle.

Although strangely at the moment little has been written about it, yet in taking work, price is perhaps most important, and next in order shade, handle and finish with regard to the actual fabric. Consequently a firm that can steal a march over its rivals in the matter of handle at the same price, is much more likely to receive the business. There is no doubt also, that the reputation of a firm in the trade, which boils down to the standard of work turned out, is nearly always busy, providing the price is right, and of this, shade, handle and finish are the three important factors, with perhaps only one other factor affecting the trade of the concern to any remarkable degree, this being delivery time.

As is well known, there is comparatively little difference between the majority of concerns, with regard to shade today, but the same cannot be said of finish, and to a still lesser extent handle. Delivery time after all, is a matter that is purely for the management of the concern and can be gained by any firm, who takes the slightest pains or trouble in this respect.

So there are two factors today, which are perhaps more important than any others, and of the two handle is the most important. Finish for the most part is obtained by mechanical means, and there is not the difference to such an extent between competing firms as exists in the matter of handle. What is important however, is that all firms can be equal in the matter of price, shade, finish, delivery time, with the utmost variation in handle on the same cloths. It is the firm that can give beneficial effects in the matter of handle, that *get* the business.

Perhaps one of the reasons why so little has been heard of handle, is that it is something unlike finish, shade, etc., that cannot be reproduced in a photograph, or illustration, the only medium is actuality.

The following are the only processes as a whole that have any beneficial effect upon the cloth. 1. Crabbing. 2. Steaming. 3. Milling. 4. Stocking. 5. Scouring. 6. Damping. 7. Decatizing. 8. Steaming. 9. Pressing. 10. Cramping. The remaining processes in dyeing and finishing have little or no effects upon the fabric. Of these, grey room processes are purely necessary as a check upon the goods and to prepare them for the necessary preparing processes. Raising has no effect with regard to handle and neither has washing off, in the sense that unsuitable materials from a dyeing point of view, are freed from the cloth. Dyeing has a certain effect upon the handle but only in certain instances; hydro-extracting has none at all, and drying has no beneficial effects. Cutting or shearing have no effect upon the handle and the same with perching. Burling and mending also belong to the same class, in that they are practiced merely with the appearance of the cloth as their primary consideration. Gas tentering also has no beneficial effects, or such processes in finishing, as rigging up, folding, measuring, final inspection and selvage or end stamping.

One process in which there is much speculation as regards its assistance in the handle of the fabric, is that of drying, yet it can be positively stated that drying does not assist the handle of any fabric to any appreciable degree. A cloth may be dried and quite possibly the effect from a handle point of view will be harmful, on the other hand, if the cloth is dried correctly, the handle is not improved beyond what has been obtained during the preparing of

the cloth, the best in any case, is that the benefits gained during the preparing of the cloth, shall not be impaired in any way. Naturally this means that the best results must be obtained from the drying operation, but the process is incapable of itself of conferring any benefit to the cloth in the matter of handle.

This brings us to those operations which affect the condition of the cloth, and which are the true handling processes. Again this can be split up into the methods used and the materials employed, which are responsible for the cloths having good, poor or indifferent handle.

In crabbing, for instance, not only will wrong methods used on a cloth perhaps lead to physical faults in the fabric but also result in impoverished handle. Crabbing in most instances results in a fabric being thinner yet firmer, but this is mostly due to the tension and pressure exerted, and also the temperature and amount of steam to which it is subjected. For example, most woolen cloths will stand more treatment than worsted cloths, without there being any impoverishment in the final handle. On the other hand there are more worsted cloths crabbed than woolen ones, for the fact that these finer fabrics require setting if faults are not to occur in the cloth. Thus fabrics of the latter type require much more skill in their preparation if the handle is not to be impoverished.

It is however possible to crab a worsted piece, and obviate the harsh handle that was evident in the cloth in the gray yet without appearing or feeling thinner in any way. This is directly due to the proper conditions being exercised with this particular cloth, which are: the tension used, the amount of steam, or boiling to which the piece is subjected, and also the length or period of time in which it is immersed in the boiling liquor under tension. Up to a certain point also the piece gains in natural luster and resulting shades from the dyehouse are bright and clear. If however this point is exceeded, harm is done to the piece and all the skill in the world in finishing will not bring it back to what it should be.

This factor is particularly well illustrated in steaming, which is frequently used as an integral part of crabbing routine. In this operation, the steam literally feeds the piece, and the cells of the fibers take up a certain amount of steam, causing them to swell to a certain degree, giving a fuller feeling and at the same time softening them. This is particularly well illustrated in the case of cross bred goods, which have a notoriously harsh handle in the majority of cases. Anyone can tell instantly the difference in handle between a cross bred piece which has been steamed and one that has not. The former in many cases after steaming having as good handle as many of the medium botany qualities. This is important if a firm is engaged in fierce competition, where the slightest advantage is of value.

Experiments show however quite definitely that with all goods, pieces can only be steamed to a definite point, and beyond that point, all benefits are lost forever. The results can readily be gauged by making tests of cloth, the steaming durations being two, three, five, seven, ten and fifteen minutes steaming, at nine to fifteen pounds pressure. This improvement in the condition of the piece is a permanent one, due to the fact that the operation is carried out at a much higher temperature than any other ensuing process in dyeing and finishing, or for that matter any process which the cloth will have to pass through until it reaches the actual customer who wears it.

Continued steaming of the goods however, will cause the fibers to again become harsh, this being due to temperature set up, and the fact that the fibers will not stand more in the way of treatment. The wool to a great extent is killed, and no amount of skill can bring back the qualities that it should possess. Experiments in continued steaming show that beyond a certain time, (this varying with the class of cloth which is under treatment) not only does the wool deteriorate, in the case of a cross bred, and go back to its former harsh handle, but that continued steaming will actually tender the piece.

This brings in a further factor and one which is vitally important, for it affects all handling processes alike, and is the basic reason why so many firms fail to establish the finish desired by the customer, even though they may continue to keep his trade. The wool is in the plastic state for some time during the operation and for some considerable time after it, and the goods may be influenced unfavorably if they are not treated correctly when the steaming has been finished. This factor is that of cooling down, and is one which is involved in all handling processes, and is one which is vital for their success. In crabbing, the operation is not as severe on the cloth as in steaming, and consequently the cooling down can be accomplished by means of hot water, aired water and finally cold. With steaming, however, it is essential that the goods shall cool down naturally, and an attempt to shorten this time on a production basis results in impoverished handle. To obtain the fullest results in this respect, the goods must be allow to stand, so that there is plenty of air all around them.

The same is true in scouring, although to a lesser degree, because the effects on the operation are not as drastic, but with a heavy coating piece, say about 22 ozs. per yard in the gray, which does not require crabbing, but is scoured only, this handle can be impaired by too quick a cooling off of the fabric, after the actual cleansing scour has been carried out. It has been known for some time that with regard to this question, if goods are washed off in hot water, then suddenly introduced to cold, the soaps, which are not entirely washed out of the pieces at the time of the change, are curdled, and deposited in the cloth. This causes dyeing faults in many cases, but its effect in the handle of the cloth can be well gauged.

The same phenomena occurs in milling, for here if the pieces are allowed to warm up too much and are then suddenly sprinkled with solution, there is danger of felting occurring and also matting of the cloth. In milling if the solution with which the piece is treated is not of

the correct strength, then milling does not take place, but the fabric suffers in actual handle, due to the working of the fabric to a much greater extent than is necessary for the scouring it receives.

Action again follows in even such a simple operation as damping or dewing, as it is sometimes termed. The fiber cells of the fabric are fed in much the same way as they were in the initial steaming of the cloth during preparing, but in this case with water. This can only be accomplished up to a certain point, and beyond that there is no gain as regards handle; in actual practice it is impaired, the only result being that the goods are slightly heavier in unit weight.

When correctly damped or dewed, pieces laid in piles should heat up in about an hour or two, but take anywhere from twelve to twenty-four hours to cool down again properly. This operation serves as an infallible guide as to goods which have been correctly prepared and those which have not, for those that have heat up, and nothing on earth will induce goods which are incorrectly prepared to heat up after damping. This heat is not great, but it can be felt by handling the cloth some time after the operation, and is a certain guide that the wool fibers have not been "killed" by improper or excessive treatment during preparing.

Naturally these goods cannot be cooled in the usual way, but the same thing happens when the goods are hurried forward to the next process, generally that of decating, for the action taking place in the piece is stopped and with it all possible benefits in handle.

Cooling down again takes places in decating by means of an exhaust pump on the machine and it will be found that the handle is "thick and cakey" when this is done and not a natural handle. The object of this operation should be to fasten the benefits of the damping operation and not to produce artificial glaze and handle with the goods, by means of surface glaze, which is all that using the pump means.

Pressing is the ideal example of the handling processes for here are the factors which govern the means of obtaining handle in which heat, pressure or tension, time and moisture all play their parts, and these factors must be handled correctly if the utmost is to be achieved with regard to handle.

In paper and plate pressing, which, properly used, gives a handle that cannot be surpassed by any other method in the world, even today, warm papers, hot press plates, weight of the hydraulic press, coupled with damping, and correct decating to ensure the primary condition of the cloth, induce sweating of the fibers as the goods gradually cool down under pressure, and it is this sweating or working of the fabric, which must have its time, and which cannot be cut down, that produces the handle, that meets with universal admiration. Pressing from four to six hours will certainly crease the pieces or put a rigg in them, but it will never produce handle in a cloth.

Handle is the most elusive characteristic in the textile world, yet is one which commands business.

Technical Notes from Foreign Sources

Measurement of Surface Reflection (Total Luster) Upon Dyed Surfaces

E. Ristenpart and H. Schwerdtner—Mell. Textil-Ber. 16, 197 (1935).—The authors refer to a paper published in Melliand (15, 418 [1934]), in which the fundamental rules relating to surface-luster and its measurement were discussed. The present paper extends the principles and methods, there worked out, to the case of dyed textiles. Some interesting points are brought out, summarized under the following statements:—

1—Viewed strictly, the yarns possess no luster.

2—Viewed lengthwise, the luster increases with increasing darkness (apparently not depth of dyeing, as the term is usually employed) of the color. The same yarn possesses more luster when dyed blue than when dyed with yellow, more with green than with red, and more with black than when undyed.

3—The higher value of lustrous viscose in comparison with mercerized cotton is much greater than would be expected.

4—Delustering viscose during the spinning gives better results than when subsequently delustered.

The authors worked with the Pulfrich photometer. They consider that the methods employing color-filters lead to false results.

Five diagrams and three very full tables are included.

Practical Hints for Printing with Naphthol AS and Rapidogen Dyestuffs

Dr. F. Streng—Mell. Textil-Ber. 16, 204 (1935).—A valuable, but general article—methods, not details, given fully.

The Homogeneity of Natural Cellulose and Its Derivatives

A. Sakostschikoff and D. Tumarkin—Mell. Textil-Ber. 16, 214 (1935).—The first section of a paper, to be continued.

The present section has as its subtitle "The cross-section of the fiber and preparative methods for its iolation." This section is intensely descriptive as to the characteristics of different kinds of fibers, and as to the methods in detail as to preparation of cross-sections of them for microscopic study.

The paper is well worth study by those working specially in this field.

Annual Meeting and Convention
A. A. T. C. C.
Providence, R. I.
December 4 and 5

NEW PRODUCTS—TRADE NOTES

● TEXTILE SCHOOL CONFERENCE

The fifth of a series of conferences sponsored by the Textile Foundation attended by the deans of the twelve textile schools in the United States, has recently been concluded in New York City. In addition to the deans whose names follow, the conference was attended by Franklin W. Hobbs, Chairman, and Frank D. Cheney of the Board of Directors of the Textile Foundation, F. M. Feiker, who presided at the conference meetings, and E. T. Pickard, secretary of the Foundation: Chas. H. Eames, of Lowell Textile Institute; W. D. Fales, Rhode Island School of Design; George Walker, New Bedford Textile School, H. W. Nichols, Bradford Durfee Textile School, Fall River; Dr. E. W. France, Philadelphia Textile School; Dean Thomas Nelson, North Carolina State College; Dean H. H. Willis, Clemson College; Mr. C. A. Jones, Georgia School of Technology; E. W. Camp, Alabama Polytechnic Institute; J. B. Bagley, Texas Agricultural and Mechanical College; M. E. Heard, Texas Technological College, and Dr. W. H. Dooley, Straubenmuller Textile High School.

Dr. A. H. Williams and Prof. M. E. Michl of the Wharton School, presented at one of the sessions a progress report on the work now being done in preparing text material for the teaching of textile economics.

On Thursday, the deans entertained a number of guests at luncheon. In addition to the deans and officers of the Foundation those present were: Dr. Claudius T. Murchison, President, The Cotton-Textile Institute; Arthur Besse, President, National Association of Wool Mfgrs.; W. Ray Bell, President, Association Cotton Textile Merchants; F. E. Simmons, Underwear Institute; Earl Constantine, Managing Director, National Ass'n Hosiery Mfgrs.; Charles Whitney Dall, Director, National Rayon Weavers Ass'n; F. S. Blanchard, Pacific Mills; Albert L. Scott, President, National Association of Finishers of Cotton Fabrics; Stanley B. Hunt, Textile Economics Bureau, Inc.; Louis W. Fairchild, Fairchild Publications; Douglas G. Woolf, Editor, *Textile World;* A. F. Allison, Managing Director, International Association of Garment Mfgrs.; Ernest C. Morse, Managing Director, Associated Wool Industries; Russell T. Fisher, President, National Association of Cotton Mfgrs.; Dr. L. A. Olney, Lowell Textile Institute, and Theodore Haywood, Philadelphia.

Each of the guests made a three-minute talk making observations and suggestions, and offering the deans fullest cooperation of themselves and their trade groups in the effort to adapt textile education to better meet the needs of modern industry.

One afternoon the deans visited the Straubenmuller Textile High School, and under the guidance of the Principal, Dr. Wm. H. Dooley, studied the remarkable equipment and the work that is being carried on in that institution.

At other sessions very helpful discussions were led by F. S. Blanchard, chairman of the Economic Research Committee of the U. S. Institute for Textile Research, on the subject of "The Organization of Production and Distribution in Textile Industries—a Study of Trends"; and, Mr. M. D. C. Crawford of the Fairchild Publications on the subject of "Style and Design."

● RESEARCH ON OPTICAL GLASS

A broad program of fundamental investigations on the chemistry and physics of glass surfaces to aid in the development of scientific apparatus and ophthalmic instruments has been started at Mellon Institute of Industrial Research by the Bausch & Lomb Optical Company, of Rochester, N. Y. The first studies will be concerned with the effects of environmental factors on the durability of the various types of glass used in optical instruments.

The Bausch & Lomb Optical Company, whose research in optical glass dates from the initial work of William Bausch in 1912, has maintained a fellowship at Mellon Institute since 1931 for research on various plant and production problems in optical technology. New developments in the past have included improved greases for optical instruments, cements for ultra-violet transmitting optics, improved methods for making and testing mirrors and reflectors, and standardization of the sizes of fine abrasives used in grinding lenses.

Dr. Frank L. Jones, the fellow since 1931, will be in charge of the new investigations of the Bausch & Lomp Optical Company at Mellon Institute. An enlarged staff will continue the work on plant problems at the new research laboratory of the company at Rochester. Dr. Jones received his professional education at Bucknell (B.S., 1925) and at Columbia (A.M., 1927; Ph.D.. 1931).

● BRITISH DYESTUFFS BUSINESS

Coronation orders placed in September resulted in an improved demand for domestic dyes in England particularly from the paper trade and from manufacturers of low-grade woolen buntings, according to a report from Manchester, the British textile center, made public by the Commerce Department's Chemical Division.

Dye deliveries to the worsted section of the wool trade were poor but a better demand for tweeds resulted in a satisfactory movement of dyestuffs in that particular trade, the report states.

On the other hand, reduced demand from the United States and the Continent for high-class woolens curtailed sales of dyestuffs for that class of textiles, the report states. Dyers associated with the carpet, finishing fabric and upholstery woolens trade were also well engaged during September.

A considerable increase in dyestuffs consumption was reported in the garment dyeing trade as well as with linens, the latter trend being due to increased orders from the United States, it was stated.

There was some revival of trade reported by acetate rayon dyers but business with real silk remained depressed, the report states.

● APPROVED CORONATION COLORS

After due deliberation upon the historical association of colors and after considering their utility in light of present-day needs the British Colour Council has approved 8 colors for use in the textile and other industries preparing materials for the Coronation celebration to be held in May, 1937, according to advices reaching the Commerce Department's Chemical Division.

The book of Coronation colors issued by the Council and obtainable at one guinea per copy by non-members is copyrighted and may not be reproduced in any form of color card without permission, it was stated.

Colors listed include Coronation Red, Coronation Blue, Coronation Gold, and Coronation Green, together with four pastel shades listed as Marlborough Blue, Holyrood Green, Buckingham Lilac, and St. James' Rose, — the last four being named after Royal residences.

Coronation Red which in European history has long held an important place in ceremonial dress and decoration, it being the present day official crimson of the British Army.

Coronation Blue, a color slightly more red than lapis lazuli, is nationally significant as the blue of the British flag and the Royle blue of Admiralty bunting.

Coronation Gold, is a golden yellow softened to make it generally becoming and adaptable for many purposes.

Coronation Green, represents the commonest color in nature and is associated with tranquility and long life.

According to the book of Coronation colors Marlborough Blue is a pale forget-me-not shade; Holyrood Green is a color that has been used from earliest times in decorative art, particularly in glassware, pottery and enamels; Buckingham Lilac is interesting historically in that it was

used during the middle ages in the production of tapestries; and St. James' Rose suggests the faded old rose color of period gowns worn during the romantic era.

• SYNTHETIC OLIVE OIL

The Wool Industries' Research Association is now engaged on tests which may enable the wool industry to overcome the scarcity of olive oil caused by the Spanish civil war. The supplies of olives have been greatly reduced by the war, and the chemists at Leeds are hoping to produce a satisfactory substitute oil. Among the samples of synthetic oil submitted to the research association is one from Mr. Walter Garner, chief chemist to Lister & Co., Ltd., of Manningham Mills, Bradford. The Spanish war has caused the price of olive oil to rise from £50 to £90 a ton. As it is an important commodity in the wool industry, over 4,000 tons being used annually in the spinning process, some anxiety is felt. Mr. Garner claims to have perfected his synthetic oil after years of experimental work. He estimates that if it were used generally it would save the industry £120,000 a year. The oil is made from raw materials grown in the Empire.—*Chemical Age*.

• NEW CORROSION RESISTANT SPECIALTIES

Two new products designed to meet corrosive problems in a variety of plants where acid, alkali and other corrosive agents are encountered have just been announced by manufacturers. One of these is a Monel caster for trucks, hampers and wheeled conveyors of all kinds. Available in both the stationery and swivel roller type, it is adapted to use in chemical, processing plants, laundries, dry cleaning and similar establishments where the corrosive materials are liable to spill over on the floor.

Metal parts of the caster are entirely of Monel, including bearings, shaft and spacers. Wheels are of a special rubber composition. The casters are manufactured by the Bassick Company, Bridgeport, Conn.

The second piece of equipment is designed for use in similar plants and in a special adaptation of an earlier piece of equipment. This is the Whitehead graduated type Monel pail, now made available in standard sizes of 12, 14 and 16 quarts. Its development follows the general acceptance of the non-graduated type of Monel pail which has been on the market for several years.

Botton and sides are of .037 of an inch Monel electrically seam welded. The chime also seam welded is .078 of an inch thick and is seam welded to project one-half of an inch below the bottom. Monel ears are spot welded to the sides. The handle is five-sixteenths of an inch Monel rod and the rim is rolled over a three-sixteenths of an inch wire. The seam cannot break open and there are no rivets at which leaks can start.

• NATIONAL RELEASE

National Aniline & Chemical Co., Inc., announces release of a bulletin on the following new product:

National Alizarine Fast Blue RB—a further addition to the National line of fast-to-light acid blues. It is greener and brighter than National Alizarine Blue GRL, slightly faster to light, and considerably superior in neutral dyeing properties. It is said to be sufficiently level dyeing to be suitable for use in combination with other light-fast acid dyes such as are commonly used for mode shades on ladies' wear. It is especially recommended by the manufacturers for the dyeing of carpet yarns, upholstery materials and automobile cloths, as it is said to have excellent fastness to light, water, salt water spotting, alkali spotting and rubbing. It is further said to yield pure blue tones on pure silk and to have fairly good affinity for tin-weighted silk. Although turning much greener and duller, it is stated that this color may be used in combination with chrome colors, while its neutral dyeing properties adapt it to the dyeing of wool in unions. Bulletin No. 204.

• JOINS WARWICK CHEMICAL

A. Brandt, formerly in charge of dyeing and finishing at Jos. Brandt & Bro., New York City, has joined the technical service staff of Warwick Chemical Co., West Warwick, R. I.

• CHAS. H. STONE LIST

The November, 1936, issue of the listing of the products of Chas. H. Stone, Inc., has recently been distributed. This is No. 114 of this publication. In addition to the list of products manufactured by this company there is also included an historical account of the activities of the company from the time of its founding in November, 1926, until the present time and there are also a number of photographs showing the plant, office and various warehouses. Copies of this bulletin are available upon request.

• I.A.T.M. CONGRESS

The second international congress of the International Association for Testing Materials will be held in London, England, April 19th-24th, 1937. Participation in the congress is open to all interested in the study of materials and their testing upon payment of the membership fee. The subjects for discussion have been divided into four groups: metals, inorganic materials, organic materials and subjects of general importance. Requests for further information should be mailed to the honorary secretary of the congress, K. Headlam-Morley, The International Association for Testing Materials, 28, Victoria Street, London, S.W.1.

• GENERAL RELEASE

General Dyestuff Corp. announces release of a circular describing the following new product:—

Palatine Fast Yellow 6 GEN—a new greenish yellow of the Palatine Fast series, which on account of its level dyeing properties is said to be of special interest as a shading color for combination shades. It is said to be of very good solubility and to be suitable for machine dyeing. It is further said to be of good fastness to washing, water and salt water, perspiration and crocking and therefore to be of special interest to the dyers of knitting yarn and carpét yarn. It is stated that it penetrates well and is recommended by the manufacturers for the dyeing of woolen and fur hats. It discharges to a clear white with Rongalite CW. Circular I.G. 1242.

• PRICES, TITANOX PIGMENTS

Revised prices on Titanox Pigments have been announced by the Titanium Pigment Co., Inc., effective as of November 1st. A copy of the bulletin announcing the new prices is available upon request.

• SHEET STAINLESS STEEL

The American Rolling Mill Company announces that it is ready to take orders for large sheets of stainless steel. At Cleveland's National Metal Congress this company displayed a sheet which was 10-gage, No. 4 polish and measuring 84 by 240 inches in size. It is stated that large sheets such as this will minimize welding and forming operations.

• PRESENTATION, CHEMICAL INDUSTRY MEDAL TO DR. WALTER S. LANDIS

The Chemical Industry Medal for 1936 was presented on November 7th to Dr. Walter S. Landis of the American Cyanamid Company at a joint meeting of the American Section of the Society of Chemical Industry and the American Chemical Society, held at the Chemists' Club, New York City. Dr. M. C. Witaker first spoke on the accomplishments of the Medalist and then the presentation of the medal was made by Dr. D. D. Jackson of Columbia University.

In accepting the medal Dr. Landis told about the developments in the fertilizer industry, the subject of his paper being "Concentrated Fertilizers."

• PERKIN MEDAL AWARD

Dr. Thomas Midgley, Jr., has been elected to receive the Perkin Medal of the Society of Chemical Industry for 1937. The medal is awarded annually for valuable work in applied chemistry and will be presented this year to Dr. Midgley for his work in the development of anti-knock motor fuels, safe refrigerants, etc. The selection is made by a committee represent-

ing the five chemical societies in the United States.

The medal will be presented on January 8 at a meeting to be held at The Chemists' Club. Details will be announced later.

● ANNUAL MEETING, U.S.I.T.R.

"Nothing can stop Japan from becoming the largest manufacturer and exporter of textiles in the world, and tariff walls cannot be built high enough to keep out Japan's textiles," was the assertion of a speaker at the annual dinner of U. S. Institute for Textile Research at the Waldorf-Astoria on November 5th. He revealed himself later as an impersonator and humorist; but it was generally agreed that his statement was based upon many disquieting facts.

Hon. Francis P. Garvin, president of the Institute and of the Chemical Foundation, acted as toastmaster, and the other speakers were Dean Joseph H. Willits of the Wharton School of Finance and Commerce, University of Pennsylvania, who explained the plans and objectives of a survey of integrated manufacturing and merchandising, financed by the Textile Foundation and conducted under the sponsorship of the Institute for Textile Research with the cooperation of a dozen leading textile associations; and Dr. Elvin H. Killheffer, executive vice-president of the Institute for Textile Research, whose subject was "Why Textile Research?" An audience of 150 was in attendance, and, in addition to textile association officials cooperating in the Wharton School research, the Institute had as its guests Franklin W. Hobbs, chairman, and E. T. Pickard, secretary, of the Textile Foundation.

Practical Results of Basic Cellulose Research

At the open research conference in the afternoon the principal speaker was Dr. Wanda K. Farr, who told of progress and objectives of the basic research on cellulose that is being conducted at the Boyce Thompson Institute for Plant Research, Yonkers, N. Y., which study is financed by the Chemical Foundation. It was announced that the Chemical Foundation has arranged to supplement this work at Massachusetts Institute of Technology, and that a function of the latter work will be a course for graduate students designed to train them for cellulose research.

In her address Dr. Farr presented evidence that where young cotton fibers are treated with appropriate reagents, such as dilute acid or alkali, they yield small ellipsoidal particles and a material, thought to be the cementing medium, which holds the particles together. The particles, approximately six one-hundred-thousandths of an inch long, give many of the reactions of cellulose and possess the same X-ray diffraction pattern. The cementing material amounting to not more than three to four per cent of the total fiber, does not react to tests for cellulose. Its composition has not been definitely established, but it appears to consist of pectin-like materials. On the basis of the assumption that cotton fibers are composed of these cellulose-like units and cementing material Dr. Farr is able to explain satisfactorily some of the properties which cotton exhibits:

"In the textile fiber we are dealing with a very precise mixture of uniform-sized cellulose particles and the glue like cementing material which holds them together. The cellulose particles are comparatively inert, the cementing material much more highly reactive. Current belief holds that industrial treatments which weaken the fibers and, if continued long enough, reduce them to a powdery mass, have brought about cellulose degradation. These researches show that in a large number of these cases there are no measurable changes in the cellulose particles themselves. There has been merely a disintegration of the fiber through the effect of the treatments upon the cementing material. In the tensile strength of natural fibers, therefore, the interest is shifted from the molecular bonds of cellulose to the nature of the substance which holds the cellulose particles together. The high water-absorbing properties of the cementing material, as compared with the low absorption of the cellulose particles, indicates its importance in the swelling properties of fiber masses. The processes involved in dyeing, laundering, and other specialized fields of fiber reactions may likewise be considered from the viewpoint of their effect upon the cementing material as well as upon the cellulose particles.

"Textile research of the future will have the possibility of studying not only the reactions of the entire fiber mass, but also of these two primary fiber constituents in their separated form. It is believed that the results of such studies may help us to understand the hitherto unexplained properties of cellulose textile fibers in relation to their many important industrial uses."

Scientific Study of Textile Drying

The chemical processing of textiles as affecting or affected by drying temperatures and conditions was the principal subject discussed at the open conference in the afternoon. It supplemented a similar conference, held in May, which requested the Institute for Textile Research to undertake the organization and cooperative financing of a scientific investigation of textile drying processes. The committee in charge (W. E. Emley, Chm., Alban Eavenson, Dr. H. DeW. Smith) reported the financing about half completed, and presented a revised program for the research, one of the new features of which provides that the director of the study shall be available to cooperators to advise in the practical application of results of the research.

Expanded Research Program

Reports of officers and directors to this seventh annual meeting showed gratifying progress. On completion of the financing of the drying study the organization's membership will exceed 300, although its magazine circulation of over 600 is accepted as a more accurate yard-stick of the industry's interest in textile research. This organization maintains no laboratories of its own, but makes use of existing institutional laboratories with large resulting economies. Its study of warp sizing and sizing materials now in progress was cooperatively financed at $10,000; its cooperatively financed study of textile drying calls for the same fund; the economic study of manufacturing and merchandising organization is financed by the Textile Foundation at $20,000. Institute officials estimate that for this total investment of $40,000 they will obtain personnel, equipment, materials and services which, by any other method, would cost not far from $150,000. However, they are planning for the time when the industry will be paying a million dollars a year for scientific and economic research.

Officers and Directors Elected

The following officers and directors were elected: President, Hon. Francis P. Garvin; Vice-Presidents: E. H. Killheffer, Alban Eavenson, Louis A. Olney, Edward R. Schwarz, Harold DeW. Smith; Treasurer, Ernest N. Hood; Secretary, Charles H. Clark.

Directors re-elected for a term expiring in 1939 were as follows: John W. Arrington, Pres., Union Bleachery, Greenville, S. C.; H. M. Chase, Research Director, Riverside & Dan River Cotton Mills, Danville, Va.; H. Grandage, Vice-Pres., Clark Thread Co., Newark, N. J.; E. R. Schwarz, Mass. Institute of Technology, Cambridge, Mass.; Chairman of the Research Council. New directors elected for a term expiring in 1939 were: G. E. Hopkins, Technical Director, Bigelow-Sanford Carpet Co., Thompsonville, Conn.; E. Freedman, Director, Bureau of Standards, R. H. Macy & Co., New York, N. Y.; Daniel E. Douty, Pres., U. S. Testing Co., Inc., Hoboken, N. J.

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TO LEASE

Six story and basement building in the heart of the food district, 27 x 175 ft. Running through two streets with loading platforms and elevator at each end of building. Capacity, 250 lb. to square foot. Available January first. This building has been occupied by one of the largest chemical concerns for over 25 years. Address Aurora, c/o American Dyestuff Reporter, 440 Fourth Ave., New York, N. Y.